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**Post-Harvest Technology in Senegal:
Current Practices and Future Needs**

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P O S T - H A R V E S T

T E C H N O L O G Y   I N

S E N E G A L

C U R R E N T   P R A C T I C E S

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F U T U R E   N E E D S

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A C K N O W L E D G M E N T S

I N T R O D U C T I O N

This survey on post-harvest technology was conceived as part
of an IDRC sponsored project at CNRA, Bambey, Senegal.

The state of the art reflected that of March 1976 for eight
different regions of Senegal. The results from July 1976 were used
to establish some seasonal changes while the results from January
1977 were used to establish seasonal changes, nutritional status,
and future needs.

The interpretation of the results are the views of the authors
and in no way reflect the thoughts, either expressed or implied,
by IDRC or CNRA.

The thoughts expressed within are based on the authors'
experiences and the data contained on the questionnaires which,
hopefully, were properly completed by the enumerators.

C H A P T E R 1

INTRODUCTION TO SENEGAL

Senegal is the most westerly country of Africa. It is situated between latitude $12^\circ18'$ to $16^\circ41'$ north and longitude $11^\circ12'$ to $17^\circ33'$ west and covers an area of 197,161 square kilometers. To the north, Senegal is bounded by the Islamic Republic of Mauritania; to the east by the Republic of Mali, and to the south by Portuguese Guinea and the Republic of Guinea. The Gambia separates Senegal's southern region, the Casamance, from the rest of the country. The Mauritanian frontier is marked by the Senegal and Faleme Rivers, and the border with Guinea coincides with the Fouta Djalon mountains. There is no natural frontier between Senegal and the Gambia or Senegal and Guinea Bissau. Senegal also has 600 km of Atlantic Ocean seaboard.

Senegal is a flat and sandy country. The country consists of low plains covered by sediment of recent origin which is primarily "Dior" sands.

The entire country has a climate with alternating rainy seasons (July to October) and dry seasons (October to June). Rainfall declines from south to north and from the coast to the interior. Ziguinchor has a four or five month rainy season. In the north, it is much shorter. The natural vegetation ranges from Sahel savannah north of 15°N through Sudan savannah in south-central Senegal to Guinea savannah in the Casamance. Casamance is on the northern fringe of the monsoonal climate. This difference in climate results in a variety of cereal crops grown in the country. Rice is grown in the Senegal River basin, but this gives way quickly to millets (in succession from north to south), sorghum, maize and rice. Groundnuts are the chief cash crop and are grown in the groundnut basin which is located in West Central Senegal.

In terms of vegetation from north to south, we find the succession of acacia, Spanish juniper, baobab to silk cotton, oil palms and cocoa palms.

Most of the Senegalese rural population live by farming which, for most of the people, means growing peanuts, millet, sorghum, rice, maize and niebe. Since 1965 the Government has been involved in a crop diversification program and previously unused land is now growing rice, vegetables, sugar cane and cotton.

C H A P T E R 2

METHODOLOGY

2.1 SAMPLE SIZE

The probable number of families in Senegal was estimated to be 800,000. It was therefore decided to use 0.1% of the total population for the sample. The sample size was considered adequate since one felt the number of non-responses would be small. In effect, this was true for all regions except one and for the entire survey. Of the 800 families who started the survey, which went on for a year, 717 families participated during the last sampling period.

2.2 CHOICE OF SAMPLING PLAN

The most simple form of all sampling plans is random sampling. With this plan all n units selected out of the N units have an equal chance of being drawn. Selection of each of the n units can be done with tables of random numbers which can be found in most statistics textbooks.

There are times when the population has distinct sub-populations which may give invalid or less accurate results if not accounted for. For example, in studying eating patterns within Senegal, different tribes may have different patterns. Thus overall averages may be less useful than averages within each sub-population or stratum. This division of the population into strata and random sampling within each stratum is known as stratified random sampling.

There are occasions when we have sequential lists of a population e.g. student roll at a university, a telephone directory, voters lists, etc. To select a sample of n units we set $K = N/n$, then we randomly select a unit from the first K units and every K^{th} unit afterwards. This is known as systematic sampling.

One can sometimes combine stratified and systematic sampling. For example, to find out what level of nutrition education is prevalent at the University of Dakar, one could first stratify by faculty and then systematically select samples within each stratum by selecting names from the student roll.

Cluster sampling is another method. It may be difficult to obtain a sample of 1,000 families in Senegal. However, one may find 20 villages averaging 50 families each which would be representative. One could then sample each entire village. This method can be useful when transportation to villages is difficult during the rainy season or if it would cost too much to transport the interviewers about the country.

The sampling plan we chose was by process of elimination. Random sampling was impossible because the entire population would be hard to define. This has been experienced by several West African countries while doing their census. Since the entire population was unknown, systematic sampling was also impossible. It was impossible to set up the entire population in a list since the last census was done several years ago. There would have been a certain percentage of migration which would have ruined the plan. Using either systematic or random sampling, one could have had a possible 800 different locations within the country. The cost involved in obtaining each response would have been too great to warrant utility of such a plan. This left us with the possibility of a modified cluster sampling plan. Firstly, the country was stratified into eight regions, each with a sample size of 100 families. The 100 families were usually made up of four to five villages of 20-25 families each.

Dagana was chosen as the center of the region in the north. This region represents some of the rice growers of the Senegal River basin, some herdsmen of the Ferlo and some groundnut-millet farmers towards Louga. Any further action plan could be initiated at Richard Toll where ISRA has an established research station.

Louga was chosen because of its geographic importance. Much of this region lies in the drought stricken region of the country. Furthermore the area is reputed to be known for its cowpea production and consumption.

Khombole and Fissel were chosen primarily as comparison locations. Previous studies have been done at Khombole; therefore a study such as this may provide some information about the people with the difference in time. Fissel is the centre of an extention training school operated by the Human Resources Division.

Bambey, being the largest research centre of ISRA, was chosen to see what impact the centre had on the local people.

The centres of Nioro, Sedhiou and Sinthiou Maleme represented three different ecological areas as well as being centres of research under ISRA.

It was decided not to use proportional allocation since areas such as Dagana and Sinthiou-Maleme would have a very small sample size while that of Khombole, Fissel, Nioro and Bambey would be extremely large. In a sense, proportional allocation was assured since the regions Khombole, Bambey and Fissel are in the high population density areas of the country. On this basis the overall

survey percentages might indicate what those for the rural area
could be.

Within each strata (region) government officials and village
chiefs were called together and the objectives of the survey
explained to them. Accordingly, they chose several villages
which they felt would be representative of the area. Within each
of these villages (clusters), the village chiefs chose families
which they felt would be representative of the village. Generally,
most of the village was included.

In the analysis we did not use the clusters, rather we used
only the different strata. Any favoring of a particular group
within a village would therefore be confounded with that of the
other villages. No inference was made concerning the population
from which the sample was taken, thus any deviations from randomness
or normality need not be considered.

2.3 CHOICE OF TEAM LEADERS AND ENUMERATORS

A team leader and four enumerators were chosen by the Human
Resources Division of the Government of Senegal for each stratum.
These girls were seconded to ISRA for training, the pre-test
and the three sampling periods. They were chosen from the strata
in which they were to work so that a rapport with the villagers
already existed. In all cases, they spoke the local dialect,
which for most cases was Ouoloff. They were chosen for their
ability to work under difficult conditions and their ability to
learn. All of the girls had at least 6-10 years of schooling
with several having more than ten.

The team leaders were responsible to unite the officials and
chiefs necessary for the choice of villages. They were then
responsible for the choice of families within each village.

During the field work they were to see that the survey work
was being well carried out. At the end of the first two periods
in the field they were also responsible for coding the data on
forms for data processing.

The enumerators only responsibility was to see that each
questionnaire was properly filled out. Each enumerator was
to question two families per day, the rest of the time was for
observation. It would seem that, if this was done, the results
do reflect the true situation.

FIG. I   LOCATION OF STRATA CENTERS

2.4 DEVELOPMENT OF QUESTIONNAIRES

2.4.1 Question Types

Questionnaires can be of two types: for those not knowing the subject matter; one uses an open answer type of question; for those having some knowledge of the subject a closed response question is better since it is easier to analyze by computer.

a)   Type 1 (type numbers as designed by the authors)

These are open-ended questions that ask for a word or sentence for an answer, e.g. what is your ethnic origin? Type 1 questions are best for pre-tests as they are difficult to analyze by computer.

b)   Type 2

These are open-ended questions that demand a series of words or sentences (list), e.g. what food items do you buy regularly?

c)   Type 3

This type of question is derived from Type 1 questions. When one's knowledge of the subject is adequate either by experience or by a pre-test, this type of question is favoured over Type 1 questions, e.g. what is your ethnic origin: 1) Ouoloff; 2) Serere; 3) Peulh; 4) Mandingue; or 5) Other. A knowledge of the subject ensures that a very small percentage of responses fall within the "other" category.

d)   Type 4

This is a derivation of Type 2, e.g. what food items do you buy regularly? (answer yes or no for each part): a) sugar ___; b) tea ___; c) rice ___; d) coffee ___; e) tomato paste ___.

e)   Type 5

This type of question involves numbers, e.g. how many children do you have? Type 5 questions can be converted to Type 3 by establishing classes, e.g. How many children do you have? 1) 0-2; 2) 3-5; 3) 6-8; 4) more than 8.

2.4.2 Question analysis

There are times when questions of Type 1 must appear in a questionnaire. If this is the case, one proceeds as follows. The question is analyzed to find what the different responses were. As a response appears, it is assigned a positive integer (starting at 1). The second response to appear would be given a 2 and so on. In effect, this operation would create a list and convert the question to Type 3. A frequency table for each response could be created at this time. After all the questionnaires have been examined, several items appearing rarely could be regrouped to the category "other". The remainder would be renumbered and coded on computer sheets.

Type 2 questions would follow a similar procedure. A list of responses would be made and then regrouped so that those appearing rarely are in "other" category as a Type 4 question. Returning then to each questionnaire, we would take each choice and see if the person responded to that choice. If he did, we answer yes, if he did not, we answer no. Generally one can use 1 as the yes code, and 2 as a no code (with 0 being a non-response). The question in our survey on functional properties was a Type 2 question.

We examined the question on functional properties of millet to find that out of 800 families, there were only 19 functional properties considered. Then each questionnaire was treated as a Type 4 question with 19 choices each requiring a yes or no.

Type 1 questions require less space on input than do Type 2. Type 1 questions take only one answer, where in our example above, a Type 2 question required 19 answers.

Type 3 questions are extremely easy to analyze. For example, if we have a frequency table for ethnic origin, the response value serves as a pointer to the item in the frequency table which need be augmented by 1.

Type 4 questions are dealt with much as Type 3 in that the response value serves as a pointer, but a frequency plot is constructed for each part. This would give us the number of yes answers, the number of those answering no and the number of non-respondents for each part.

Type 5 questions are dealt with in one of two ways. In our example on the number of children we can ask how many families have x children (frequency plot) or what is the total number of children for all respondents. Note that this total divided by the frequency gives us the mean. Type 5 questions can be used to create new variables for analysis. For example if we have the following question:

How many children do you have?

a)   male 0-6 years
b)   female 0-6 years
c)   male 7-16 years
d)   female 7-16 years
e)   male over 16 years
f)   female over 16 years

we could create the following variables:

a)   number of male children (a + c + e)
b)   number of female children (b + d + f)
c)   children 7-16 (c + d)
d)   children over 16 (a + b)
e)   children 0-16 (a + b)
f)   total children (a + b + c + d + e + f)

2.4.3 Design of Questionnaires Used

The pre-test questionnaire was designed in conjunction with the IDRC program officer at Dakar. It contained only Type 1 and Type 2 questions. It was tested at Bambey-Serere and in each of the regions (approximately 200 questionnaires). Parallel to this, a sample questionnaire using questions primarily of Types 3, 4, and 5 was drawn by one of the authors (GY) and tested at Bambey-Serere. The results of the pre-test were collected and the survey questionnaire (Appendix I) was drawn up along the lines of the sample questionnaire. The survey questionnaire was tested both by the team leaders and the enumerators through role playing and by field tests at Bambey-Serere. Training of team leaders was based on development of the survey questionnaire from the pre-test, completion of the questionnaire, and coding of results for computer analysis. Training of enumerators was based primarily on the survey questionnaire.

The questionnaire used for period 3 (Appendix 2) was drawn up by the authors and the team leaders. The training on use of the questionnaire was left to the team leaders. Coding of period 3 results was done by the post-harvest technology division at CNRA.

2.4.4 Problems Encountered in Faulty Questionnaire Design

Questions on revenue were one problem. A "0" was used for no revenue as well as a non-response. This was not considered serious since one cannot place too much importance on this data.

The question on grain quantities in stock had class boundaries that were too wide. As a result some information may have been lost. Once again the data may not have been that reliable.

The questionnaire should have been designed for the above questions such that the raw and coded value appeared on the questionnaire. For example, if we have answers for questions 11a and 11b (Appendix 1), it would have been useful to indicate the actual income as well as the related code. In that way means could have been calculated.

2.5 Field Work

The survey was divided into 3 periods, the first being in March 1976 during the dry period; the second being in July 1976 during the rains; and the third period being in January 1977 during the period of groundnut sales.

Transport was furnished by CNRA whenever possible. The enumerators resided in the villages where they were working with housing being provided by the village. At all levels, the cooperation of all concerned was excellent.

2.6 Analysis of Results

The coding sheets were given to an external agency for key punching. The data thus obtained was stored as a direct access file. Corrections were then made by comparing the computer listing with the original questionnaires. This eliminated the problem of errors in key punching. The corrections having been made, a second listing was made and compared with the first listing. The few corrections that were needed were then made. We can therefore say that the results contained in this report do reflect what was on the questionnaire. We cannot verify the link between the enumerator and the respondent.

The data was analyzed with a program written in Fortran IV by one of the authors (GY). The coded results for each of the 800 questionnaires are available on computer tape and a listing probably could be obtained from the Director, CNRA, Bambey, Sénégal. For interested individuals, Appendix III gives a description of the tape contents.

Many of the tables presented in this report contain three vertical numbers for each cell. The first represents the frequency for the cell, the second represents the percentage as expressed by the row total, while the third represents the percentage as expressed by the column total. Thus, the second number would give us the percent contribution of the region towards the total for a particular class while the third number would give us the percentage of a particular class for a region.

C H A P T E R 3

SOCIOLOGICAL BACKGROUND

3.1 ETHNIC ORIGIN

The Ouoloffs represent about 1/3 of the Senegalese population. They are the principal ethnic group in the departments of Louga, Linguere, Thies, Diourbel and Kaolack. One finds then in lesser numbers in the East, in the Saloum, in middle Casamance and in Cap-Vert. They are farmers who cultivate millet and groundnuts.

The Serere are found in the Diourbel and Sine regions and in times of increased land pressure have migrated to other less cultivated areas of Senegal. They are reputed to be the best farmers in the country.

The Peulhs are a nomadic tribe found principally around Dagana, Bakel and in the upper regions of Senegal Oriental.

The Toucouleurs are found in much the same region as the Peulhs. They are very strong in their religious beliefs, being Muslim. They are migratory and often come to Dakar to find work during the dry periods of the year.

The Diolas come from the Casamance and are principally growers of rice.

The Mandingues originally came from Mali. They are found in the southern part of Senegal and in Gambia. They are known by other names such as Malinke (Casamance), Sarakole (Gambia), Bambara (Saloum) and Soce (Saloum). They are also farmers.

The sample chosen for the survey (Table 3.1) represents the general trends very well with one excpetion. We find 80 Ouoloffs in the Dagana region. Actually the villages chosen were probably equidistant to Linguere or Louga (one village being 109 km southwest of Dagana) both of which are Ouoloff strongholds.

In terms of agricultural practices, the Mandingues, Diolas, Ouoloffs and Sereres would be the four principal tribes involved. Using the Bambey region, the Ouoloffs and Sereres were compared. Similarly, using the Sedhiou region Mandingues and Diolas were compared. One can therefore say that it appears that differences are really due to climate, that is, an ethnic tribe settles in a region that is conducive to its life-style. Stratification was therefore done by regions.

Table 3.1

Ethnic Origin

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIOC	SECHICU	SINTHIOU	TOTAL
1	Ouoloff	80	96	72	55	17	91	3	0	414
		19.3	23.2	17.4	13.3	4.1	22.0	0.7	0.0	100.0
		80.0	96.0	72.0	55.0	17.0	91.0	3.0	0.0	51.8
2	Peulh	6	1	1	0	0	3	8	54	73
		8.2	1.4	1.4	0.0	0.0	4.1	11.0	74.0	100.0
		6.0	1.0	1.0	0.0	0.0	3.0	8.0	54.5	9.1
3	Toucouleur	2	1	3	1	2	3	0	3	15
		13.3	6.7	20.0	6.7	13.3	20.0	0.0	20.0	100.0
		2.0	1.0	3.0	1.0	2.0	3.0	0.0	3.0	1.9
4	Serere	0	0	19	44	77	2	1	0	143
		0.0	0.0	13.3	30.8	53.8	1.4	0.7	0.0	100.0
		0.0	0.0	19.0	44.0	77.0	2.0	1.0	0.0	17.9
5	Diola	0	0	0	0	0	1	23	0	24
		0.0	0.0	0.0	0.0	0.0	4.2	95.8	0.0	100.0
		0.0	0.0	0.0	0.0	0.0	1.0	23.0	0.0	3.0
6	Bambara	1	0	2	0	0	0	1	1	5
		20.0	0.0	40.0	0.0	0.0	0.0	20.0	20.0	100.0
		1.0	0.0	2.0	0.0	0.0	0.0	1.0	1.0	0.6
7	Sarakhole	1	0	0	0	0	0	1	3	5
		20.0	0.0	0.0	0.0	0.0	0.0	20.0	60.0	100.0
		1.0	0.0	0.0	0.0	0.0	0.0	1.0	3.0	0.6
8	Mandingue	0	0	0	0	0	0	36	15	51
		0.0	0.0	0.0	0.0	0.0	0.0	70.6	29.4	100.0
		0.0	0.0	0.0	0.0	0.0	0.0	36.0	15.2	6.4
9	Others	10	2	3	0	4	0	27	23	69
		14.5	2.9	4.3	0.0	5.8	0.0	39.1	33.3	100.0
		10.0	2.0	3.0	0.0	4.0	0.0	27.0	23.2	8.6
	RESPONSES	100	100	100	100	100	100	100	99	799

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3.2 RELIGION

The majority of rural Senegal is Muslim,of which there are three sects: Tidjanes, Mourides and Khadriyas. There is an important Catholic minority among the Diolas and Sereres. These were largely reflected in our choice of sample. There are also some traditional African religions practiced in the Casamance and Senegal Oriental. Our sample included the people who were not Christian or Muslim in the Casamance but not in Senegal Oriental since the region where such practices are common does not constitute an important agricultural zone (Table 3.2).

The larger towns are a mixture of Muslims and Christians; most of the expatriate population being Christian. Since the survey deals primarily with rural people, the religious practices followed by the Muslims are of prime importance.

3.3 AGE OF THE WOMEN INTERVIEWED

The majority of the women surveyed were between 21-50 years old (Table 3.3). Out of the 717 women who participated throughout, there were six cases where the woman answering during the second period was younger than before. This could indicate a re-marriage of the husband. Similarly, there were five cases where the woman interviewed was older (by two classes) than before. These changes may also indicate that the older woman was occupied with her work during the first period, thus letting the second wife respond to the questionnaire.

3.4 MARITAL STATUS OF WOMEN

The marital status of the women surveyed can be important when questions concerning work generally done by the husband is concerned. There were no regional differences in marital status (Table 3.4). Of the 717 women participating in all three phases of the survey, there were only seven changes (1 divorce, 3 deaths of husband, 3 re-marriages).

Only 489 out of the 768 married women indicated that the husband had more than one wife (Table 3.5). The structure of a compound therefore would probably be one of several families.

The Muslim religion dictates a maximum of four wives, thus those 16 wives claiming they had more than three mates were probably neither Muslim nor Christian. There could have been a misunderstanding of the question as well or the enumerators could have made an error in coding.

TABLE 3.2

RELIGION

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICF C	SEDH ICU	SINT HIOU	TOTAL
1	Muslim	100	99	100	98	82	100	88	98	765
		13.1	12.9	13.1	12.8	10.7	13.1	11.5	12.8	100.0
		100.0	99.0	100.0	100.0	82.0	100.0	88.0	99.0	96.0
2	Christian	0	1	0	0	17	0	3	1	22
		0.0	4.5	0.0	0.0	77.3	0.0	13.6	4.5	100.0
		0.0	1.0	0.0	0.0	17.0	0.0	3.0	1.0	2.8
3	Other	0	0	0	0	1	0	9	0	10
		0.0	0.0	0.0	0.0	10.0	0.0	90.0	0.0	100.0
		0.0	0.0	0.0	0.0	1.0	0.0	9.0	0.0	1.3
	RESPONSES	100	100	100	98	100	100	100	99	797

TABLE 3.3.

AGE OF WOMAN INTERVIEWED

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOK C	SEDH ICU	SINT HIOU	TOTAL
1	0 - 20	3	8	1	9	6	10	4	12	53
		5.7	15.1	1.9	17.0	11.3	18.9	7.5	22.6	100.0
		3.0	8.0	1.0	9.0	6.0	10.0	4.0	12.2	6.6
2	21 - 30	21	38	25	31	35	23	38	49	260
		8.1	14.6	9.6	11.9	13.5	8.8	14.6	18.8	100.0
		21.0	38.0	25.0	31.0	35.0	23.0	38.0	50.0	32.6
3	31 - 40	37	32	25	34	31	33	33	16	241
		15.4	13.3	10.4	14.1	12.9	13.7	13.7	6.6	100.0
		37.0	32.0	25.0	34.0	31.0	33.0	33.0	16.3	30.2
4	41 - 50	33	16	33	20	19	28	21	14	184
		17.9	8.7	17.9	10.9	10.3	15.2	11.4	7.6	100.0
		33.0	16.0	33.0	20.0	19.0	28.0	21.0	14.3	23.1
5	Over 50	6	6	16	6	9	6	4	7	60
		10.0	10.0	26.7	10.0	15.0	10.0	6.7	11.7	100.0
		6.0	6.0	16.0	6.0	9.0	6.0	4.0	7.1	7.5
	RESPONSES	100	100	100	100	100	100	100	98	798

TABLE 3.4.

MARITAL STATUS OF WOMAN SURVEYED

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICK C	SECHICU	SINT HIOU	TOTAL
1	Single	0	0	7	1	1	1	2	0	12
		0.0	0.0	58.3	8.3	8.3	8.3	16.7	0.0	100.0
		0.0	0.0	7.0	1.0	1.0	1.0	2.0	0.0	1.5
2	Married	98	95	91	99	96	95	97	97	768
		12.8	12.4	11.8	12.9	12.5	12.4	12.6	12.6	100.0
		98.0	95.0	91.0	99.0	97.0	95.0	97.0	98.0	96.2
3	Divorced	1	2	0	0	0	2	0	0	5
		20.0	40.0	0.0	0.0	0.0	40.0	0.0	0.0	100.0
		1.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0	0.6
4	Widow	1	3	2	0	2	2	1	2	13
		7.7	23.1	15.4	0.0	15.4	15.4	7.7	15.4	100.0
		1.0	3.0	2.0	0.0	2.0	2.0	1.0	2.0	1.6
	RESPONSES	100	100	100	100	99	100	100	99	798

TABLE 3.5.

NUMBER OF MATES

	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SEDHIOU	SINTHIOU	TOTAL
1	43	42	36	39	34	39	34	31	298
	14.4	14.1	12.1	13.1	11.4	13.1	11.4	10.4	100.0
	59.7	61.8	53.7	60.0	73.9	60.9	51.5	75.6	60.9
2	23	20	16	21	9	17	24	3	133
	17.3	15.0	12.0	15.8	6.8	12.8	18.0	2.3	100.0
	31.9	29.4	23.9	32.3	19.6	26.6	36.4	7.3	27.2
3	6	6	9	4	2	6	7	2	42
	14.3	14.3	21.4	9.5	4.8	14.3	16.7	4.8	100.0
	8.3	8.8	13.4	6.2	4.3	9.4	10.6	4.9	8.6
4	0	0	5	1	1	1	1	5	14
	0.0	0.0	35.7	7.1	7.1	7.1	7.1	35.7	100.0
	0.0	0.0	7.5	1.5	2.2	1.6	1.5	12.2	2.9
5	0	0	0	0	0	1	0	0	1
	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0
	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.2
6	0	0	1	0	0	0	0	0	1
	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.2
RESPONSES	72	68	67	65	46	64	66	41	489

Any introduction of new post-harvest systems would have to take this into account since the national trend appears to be more towards monogamy. Labor saving devices then become extremely importnat.

3.5 EDUCATION

The average number of children per family was four. Of the children between 7-16 years of age, only 29.3% attended school regularly (Table 3.6) even though education at primary levels is provided free by the Government. We found that in all regions the percentage of male children at school is considerably higher than that for females. This indicates that the trend to keep young girls home to help with the daily chores still exists. The figures obtained from the survey are generally a few percentage points higher than figures quoted by the Government.

The Government stance in the use of Arabic script is a good one if our sample is representative of the country since nearly 40% of the husbands have studied in a coranic school (Table 3.7). As can be expected since the percentage of girls attending school is less than that for boys, the percentage of illiterate women is considerably greater than that for illiterate men (Table 3.8).

Literacy rates may be related to the availability of schools, indicating that, although the Government has made considerable progress in this area, much remains to be done.

3.6 PRINCIPAL ACTIVITY OF THE FAMILY

In all regions except Bambey, the majority of men and women (Tables 3.9 and 3.10) claimed agriculture as their dominant activity. In Bambey this change was noted during period 2, indicating that during the dry season the families have access to other methods of earning an income whereas the other regions do not have this choice.

The activity of a family is in a constant state of flux so as to maximize revenue. One notes that although there was a definite shift towards agriculture during the rainy season, 37 women changed from agriculture in period 2 while 23 women changed to agriculture. Of the men, 88 declared their activity as agriculture in period 2 but not period 1 while 18 changed from agriculture to other activities in period 2.

TABLEAU 3.6

CHILDREN

	D	L	K	B	F	N	S	S	TOTAL
Male 0 - 2 years	24	49	47	21	27	62	29	45	304
Female 0 - 2 years	19	45	42	15	37	41	29	26	254
M 3 - 6 "	27	71	61	30	41	54	43	42	374
F 3 - 6 "	34	54	76	42	53	42	41	43	385
M 7 - 16 "	80	78	76	81	80	67	62	91	615
F 7 - 16 "	70	72	71	67	60	67	45	44	497
M over 16 "	71	72	82	65	55	50	55	42	492
F over 16 "	69	45	67	64	41	38	39	26	389
M 7 - 12 in school	32	26	22	16	22	16	20	9	163
F 7 - 12 " "	14	9	10	5	8	6	6	1	60
M 13 - 16 " "	7	14	8	4	14	0	13	3	68
F 13 - 16 " "	6	4	5	3	8	3	4	2	35
M over 16 " "	2	4	6	4	12	5	8	2	43
F over 16 " "	2	3	2	0	4	2	0	1	14
average number	3.9	4.9	5.2	3.9	3.9	4.2.	3.5	3.6	4.1
% in school	39.3	35.3	30.6	18.9	37.9	18.6	44.4	11.1	29.3
% Male in school	48.8	51.3	39.5	24.7	45.0	23.9	61.3	13.2	37.6
% Female in school	28.6	18.0	21.1	11.9	28.3	13.4	21.7	6.8	19.1

TABLE 3.7

TRAINING RECEIVED BY THE HUSBAND

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOF C	SEDH IOU	SINT HIOU	TOTAL
1	Illiterate	8	42	15	39	50	14	19	23	214
		3.7	19.6	8.9	18.2	23.4	6.5	8.9	10.7	100.0
		8.2	44.7	20.9	39.4	52.1	14.7	19.8	24.0	28.0
2	0 - 4 years coranic	12	6	12	10	11	13	16	10	90
		13.3	6.7	13.3	11.1	12.2	14.4	17.8	11.1	100.0
		12.4	6.4	13.2	10.1	11.5	13.7	16.7	10.4	11.8
3	5 - 9 " "	23	14	5	21	5	23	10	18	123
		18.7	11.4	7.3	17.1	4.1	18.7	8.1	14.6	100.0
		23.7	14.9	9.9	21.2	5.2	24.2	10.4	18.8	16.1
4	over 2 " "	19	25	34	4	1	38	26	25	172
		11.0	14.5	19.8	2.3	0.6	22.1	15.1	14.5	100.0
		19.6	26.6	37.4	4.0	1.0	40.0	27.1	26.0	22.5
5	CEP	2	1	2	0	5	1	0	3	14
		14.3	7.1	14.3	0.0	35.7	7.1	0.0	21.4	100.0
		2.1	1.1	2.2	0.0	5.2	1.1	0.0	3.1	1.8
6	BREVET	1	1	0	0	0	0	0	0	2
		50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		1.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3
7	TRADITIONAL	8	2	0	2	10	0	19	15	56
		14.3	3.6	0.0	3.6	17.9	0.0	33.9	26.8	100.0
		8.2	2.1	0.0	2.0	10.4	0.0	19.8	15.6	7.3
8	TECHNICAL	24	2	10	11	11	6	4	0	68
		35.3	2.9	14.7	16.2	16.2	8.8	5.9	0.0	100.0
		24.7	2.1	11.0	11.1	11.5	6.3	4.2	0.0	8.9
9	OTHER	0	1	5	12	3	0	2	2	25
		0.0	4.0	20.0	48.0	12.0	0.0	8.0	8.0	100.0
		0.0	1.1	5.5	12.1	3.1	0.0	2.1	2.1	3.3
	RESPONSES	97	94	91	99	96	95	96	96	764

TABLE 3.8.

TRAINING RECEIVED BY THE WOMAN

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SEDHIOU	SINTHIOU	TOTAL
1	Illiterate	44	93	26	98	82	61	30	26	460
		5.6	20.2	5.7	21.3	17.8	13.3	6.5	5.7	100.0
		44.0	93.9	26.0	98.0	82.0	61.0	30.3	29.5	58.5
2	Coranic 0-4 years	20	5	13	1	7	23	45	37	151
		13.2	3.3	8.6	0.7	4.6	15.2	29.8	24.5	100.0
		20.0	5.1	13.0	1.0	7.0	23.0	45.5	42.0	19.2
3	" 5-9 "	6	0	9	0	0	11	3	10	39
		15.4	0.0	23.1	0.0	0.0	28.2	7.7	25.6	100.0
		6.0	0.0	9.0	0.0	0.0	11.0	3.0	11.4	5.0
4	" over 9 yers	0	0	1	0	0	4	0	2	7
		0.0	0.0	14.3	0.0	0.0	57.1	0.0	28.6	100.0
		0.0	0.0	1.0	0.0	0.0	4.0	0.0	2.3	0.9
5	CEP	5	0	2	0	0	0	1	1	9
		55.6	0.0	22.2	0.0	0.0	0.0	11.1	11.1	100.0
		5.0	0.0	2.0	0.0	0.0	0.0	1.0	1.1	1.1
6	BREVET	0	1	0	0	0	0	0	0	1
		0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
7	TRADITIONAL	9	0	19	0	9	0	20	12	69
		13.0	0.0	27.5	0.0	13.0	0.0	29.0	17.4	100.0
		9.0	0.0	19.0	0.0	9.0	0.0	20.2	13.6	8.8
8	TECHNICAL	15	0	2	0	0	1	0	0	18
		83.3	0.0	11.1	0.0	0.0	5.6	0.0	0.0	100.0
		15.0	0.0	2.0	0.0	0.0	1.0	0.0	0.0	2.3
9	OTHER	1	0	28	1	2	0	0	0	32
		3.1	0.0	87.5	3.1	6.3	0.0	0.0	0.0	100.0
		1.0	0.0	28.0	1.0	2.0	0.0	0.0	0.0	4.1
	RESPONSES	100	99	100	100	100	100	99	88	786

TABLE 3.9.

PRINCIPALE ACTIVITY OF WOMAN

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICF C	SECH ICU	SINT HIOU	TOTAL
1	AGRICULTURE	51	72	6C	0	78	90	84	81	516
		9.9	14.0	11.6	0.0	15.1	17.4	16.3	15.7	100.0
		57.3	78.3	66.6	0.0	79.6	96.8	88.4	84.4	67.7
2	SEASONAL LABOUR	1	1	C	0	1	0	5	9	17
		5.9	5.9	0.0	0.0	5.9	0.0	29.4	52.9	100.0
		1.1	1.1	0.0	0.0	1.0	0.0	5.3	9.4	2.2
3	TRADTIONAL CRAFTS	15	0	4	0	0	0	0	0	19
		78.9	0.0	21.1	0.0	0.0	0.0	0.0	0.0	100.0
		16.9	0.0	4.C	0.0	0.0	0.0	0.0	0.0	2.5
4	SALE OF PREPARED FOODS	6	4	2	0	1	1	0	1	15
		40.0	26.7	13.3	0.0	6.7	6.7	0.0	6.7	100.0
		6.7	4.3	2.C	0.0	1.0	1.1	0.0	1.0	2.0
5	COMMERCE	13	1	8	0	9	1	0	1	33
		39.4	3.0	24.2	0.0	27.3	3.0	0.0	3.0	100.0
		14.6	1.1	8.1	0.0	9.2	1.1	0.0	1.0	4.3
6	OTHERS	3	14	25	100	9	1	2	4	162
		1.9	8.6	15.4	61.7	5.6	0.6	3.7	2.5	100.0
		3.4	15.2	25.3	100.0	9.2	1.1	0.3	4.2	21.3
	RESPONSES	89	92	95	100	98	93	95	96	762

TABLE 3.10

PRINCIPAL ACTIVITY OF THE HUSBAND

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRO	SECHIOU	SINTHIOU	TOTAL
1	AGRICULTURE	57	81	68	1	84	85	76	82	534
		10.7	15.2	12.7	0.2	15.7	15.9	14.2	15.4	100.0
		58.2	89.0	75.6	1.0	87.5	91.4	81.7	85.4	70.6
2	LIVESTOCK RAISING	2	0	0	5	0	0	6	10	23
		8.7	0.0	0.0	21.7	0.0	0.0	26.1	43.5	100.0
		2.0	0.0	0.0	5.1	0.0	0.0	6.5	10.4	3.0
3	FISHING	3	0	0	0	0	0	0	0	3
		100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
4	BLACKSMITH	1	1	0	0	3	0	1	0	6
		16.7	16.7	0.0	0.0	50.0	0.0	16.7	0.0	100.0
		1.0	1.1	0.0	0.0	3.1	0.0	1.1	0.0	0.8
5	EMPLOYEE	19	2	5	14	0	6	1	0	47
		40.4	4.3	10.6	29.8	0.0	12.8	2.1	0.0	100.0
		19.4	2.2	5.6	14.1	0.0	6.5	1.1	0.0	6.2
6	TRADER	4	5	12	25	3	2	3	1	55
		7.3	9.1	21.8	45.5	5.5	3.6	5.5	1.8	100.0
		4.1	5.5	13.3	25.3	3.1	2.2	3.2	1.0	7.3
7	OTHER	12	2	5	54	6	0	6	3	88
		13.6	2.3	5.7	61.4	6.8	0.0	6.8	3.4	100.0
		12.2	2.2	5.6	54.5	6.3	0.0	6.5	3.1	11.6
	RESPONSES	98	91	90	99	96	93	93	96	756

Although agriculture is most affected by seasons, other activities also show change since the income obtained by traders, etc. often comes indirectly from agriculture. Thus the minute a farmer is in financial difficulty, his neighbours, irrespective of occupation, may find themselves not too far behind.

3.7 HOUSING

The majority of homes were made of mud block or straw and were covered with straw (Tables 3.11, 3.12, and 3.13). Regional differences in the use of housing material were evident, the families using what material is most available or most economical. Although galvanized sheeting is recognized as an indication of wealth, it was used only for roofs. The houses were all of a permanent nature; it would seem that our sample touched very few nomads.

Sizes of homes is directly related to family size; the larger the family, the larger the house (Table 3.14).

There were some changes in housing during the year. Nineteen families changed homes while 43 families used a different material on their roofs during the second period.

TABLE 3.11

HOUSING - WALL MATERIAL

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	MUD BLOCK	60	23	0	5	37	8C	64	95	364
		16.5	6.3	0.0	1.4	10.2	22.0	17.6	26.1	100.0
		60.0	23.0	0.0	5.0	37.0	80.0	64.0	96.0	45.6
2	STRAW	10	58	64	71	39	0	0	2	244
		4.1	23.8	26.2	29.1	16.0	0.0	0.0	0.8	100.0
		10.0	58.0	64.0	71.0	39.0	0.0	0.0	2.0	30.5
3	CEMENT	30	18	35	23	24	20	25	2	177
		16.9	10.2	19.8	13.0	13.6	11.3	14.1	1.1	100.0
		30.0	18.0	35.0	23.0	24.0	20.0	25.0	2.0	22.2
4	GALVANIZED STEEL	0	1	0	1	0	0	0	0	2
		0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	100.0
		0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	0.3
5	OTHER	0	0	1	0	0	0	11	0	12
		0.0	0.0	8.3	0.0	0.0	0.0	91.7	0.0	100.0
		0.0	0.0	1.0	0.0	0.0	0.0	11.0	0.0	1.5
	RESPONSES	100	100	100	100	100	100	100	99	799

TABLE 3.12

HOUSING - ROOFING MATERIAL

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	STRAW	44	50	45	41	58	52	56	81	427
		10.3	11.7	10.5	9.6	13.6	12.2	13.1	19.0	100.0
		44.0	50.0	45.0	41.0	58.0	52.0	56.0	81.8	53.4
2	FIBRE CEMENT	14	1	4	1	0	2	0	5	27
		51.9	3.7	14.8	3.7	0.0	7.4	0.0	18.5	100.0
		14.0	1.0	4.0	1.0	0.0	2.0	0.0	5.1	3.4
3	GALVANIZED SHEETS	35	47	51	58	36	44	44	12	327
		10.7	14.4	15.6	17.7	11.0	13.5	13.5	3.7	100.0
		35.0	47.0	51.0	58.0	36.0	44.0	44.0	12.1	40.9
4	TILE	6	2	0	0	6	1	0	1	16
		37.5	12.5	0.0	0.0	37.5	6.3	0.0	6.3	100.0
		6.0	2.0	0.0	0.0	6.0	1.0	0.0	1.0	2.0
5	CANVAS DUCK	1	0	0	0	0	1	0	0	2
		50.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	100.0
		1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.3
	RESPONSES	100	100	100	100	100	100	100	99	799

TABLE 3. 13

HOUSING MARCH 1976

WALLS	STRAW	FIBRE CE-MENT	GALVANIZED SHEETS	TILE	CANVAS	TOTAL
MUD BLOCK	247	7	102	8	0	364
STRAW	162	5	76	1	0	244
CEMENT	7	15	146	7	2	177
GALVANIZED SHEETS	0	0	2	0	0	2
OTHER	11	0	1	0	0	12
TOTAL	427	27	327	16	2	799

TABLE 3.14

NUMBER OF BEDROOMS AVAILABLE PER FAMILY

	DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH IOU	SINT HIOU	TOTAL
1	1	4	3	2	1	10	9	12	42
	2.4	9.5	7.1	4.8	2.4	23.8	21.4	28.6	100.0
	1.0	4.0	3.0	2.0	1.0	10.0	9.2	12.1	5.3
2	7	6	10	5	10	13	23	24	100
	7.0	8.0	10.0	5.0	10.0	13.0	23.0	24.0	100.0
	7.0	6.0	10.0	5.0	10.0	13.0	23.5	24.2	12.5
3	22	14	15	25	16	13	45	22	172
	12.8	8.1	8.7	14.5	9.3	7.6	26.2	12.8	100.0
	22.0	14.0	15.0	25.0	16.0	13.0	45.9	22.2	21.6
4	15	14	20	27	25	14	12	15	142
	10.6	9.9	14.1	19.0	17.6	9.9	8.5	10.6	100.0
	15.0	14.0	20.0	27.0	25.0	14.0	12.2	15.2	17.8
5	15	25	14	14	19	16	2	10	115
	13.0	21.7	12.2	12.2	16.5	13.9	1.7	8.7	100.0
	15.0	25.0	14.0	14.0	19.0	16.0	2.0	10.1	14.4
6	11	15	11	8	13	13	5	8	84
	13.1	17.9	13.1	9.5	15.5	15.5	6.0	9.5	100.0
	11.0	15.0	11.0	8.0	13.0	13.0	5.1	8.1	10.5
7	8	5	7	8	4	9	1	0	42
	19.0	11.9	16.7	19.0	9.5	21.4	2.4	0.0	100.0
	8.0	5.0	7.0	8.0	4.0	9.0	1.0	0.0	5.3
8	4	7	3	5	5	4	0	3	31
	12.9	22.6	9.7	16.1	16.1	12.9	0.0	9.7	100.0
	4.0	7.0	3.0	5.0	5.0	4.0	0.0	3.0	3.9
9	17	8	17	6	7	8	1	5	69
	24.6	11.6	24.6	8.7	10.1	11.6	1.4	7.2	100.0
	17.0	8.0	17.0	6.0	7.0	8.0	1.0	5.1	8.7
RESPONSES	100	100	100	100	100	100	98	99	797

C H A P T E R 4

THRESHING

Threshing methods are dependent primarily on the anatomy of the plant and the climate. The climate of Senegal can be classified as high temperature/low humidity and ranges from desert to Sudan-type vegetation. Although the amount of solar radiation received is similar for the entire country, there are large differences in drying rates. These rates are influenced by the rainfall patterns and the relative humidity. In the north, the rainfall period is short and the relative humidity at harvest time varies between 40-75%. In the south, the rainfall period sometimes overlaps the harvest. That, coupled with relative humidity readings between 70-100% does not allow the farmers to dry grain to a moisture level at which it may be stored safely. The people living in the southern part of the country are forced to wait longer before threshing. In effect this sets the stage for the storage problems which follow.

Most sorghum and rice varieties are the loose panicle types; threshing of these varieties is often done by stamping. This is a relatively easy operation to carry out as can be seen from table 4.1 since the people were reluctant to pay for threshing. Threshers are available in the Dagana region for rice.

Millet is generally threshed by mortar and pestle, although there are now two different types of millet threshers available in Senegal. These threshers require a 35hp tractor and are costly to purchase. However, there are several available around Thies, Diourbel, Kaolack and Nioro. It is quite likely that much of the rural population do not know that the thresher exists. The thresher, under poor working conditions, has a capacity of 800 kg/h and upward, whereas by hand, a woman can do approximately 2 kg/h.

Maize is hard to shell if we consider that there were 207 farmers who grew maize and 130 of them were willing to pay for shelling (Table 4.2).

Millet and sorghum were threshed according to need, irrespective of the region while rice and maize appeared to be more dependent upon the workload and climate. For example, in the Dagana region, where groundnuts are not grown, people threshed their rice at harvest since there is no shortage of labor. The rice harvest in Sedhiou falls at the same time as the harvest of other grains so there is some problem with shortage of time. Also at Dagana, the climate is such that the rice can be dried very quickly whereas at Sedhiou the drying process may take considerably longer.

TABLE 4.1.

PRICE FOR THRESHING

PRICE	MILLET	SORGHUM	RICE	MAIZE
0	555	0	143	77
1	0	0	0	1
2	0	0	0	9
3	0	0	0	2
4	0	0	1	2
5	17	0	5	76
6	1	0	0	0
7	0	0	0	0
8	1	0	1	0
9 or more	24	0	17	40
TOTAL NUMBER OF FARMERS	598	200	167	207

TABLE 4.2.

TIME OF THRESHING

a) MILLET

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH IOU	SINT HIOU	TOTAL
1	AT HARVEST	15	7	16	0	12	23	42	16	131
		11.5	5.3	12.2	0.0	9.2	17.6	32.1	12.2	100.0
		24.2	8.9	18.2	0.0	13.2	24.7	48.8	18.0	21.9
2	ACCORDING TO NEED	47	72	68	10	60	44	43	72	416
		11.3	17.3	16.3	2.4	14.4	10.6	10.3	17.3	100.0
		75.8	91.1	77.3	100.0	65.9	47.3	50.0	80.9	69.6
3	AVAILABILITY OF MACHINE	0	0	4	0	19	26	1	1	51
		0.0	0.0	7.8	0.0	37.3	51.0	2.0	2.0	100.0
		0.0	0.0	4.5	0.0	20.9	28.0	1.2	1.1	8.5
	RESPONSES	62	79	88	10	91	93	86	89	598

TABLE 4.2.

TIME OF THRESHING

b) SORGHUM

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICE C	SEDH ICU	SINT HIOU	TOTAL
1	AT HARVEST	1	0	C	0	1	10	23	19	54
		1.9	0.0	0.C	0.0	1.9	18.5	42.6	35.2	100.0
		5.9	0.0	0.C	0.0	2.7	27.8	41.1	39.6	27.0
2	ACCORDING TO NEED	16	0	6	0	21	20	33	28	124
		12.9	0.0	4.8	0.0	16.9	16.1	26.6	22.6	100.0
		94.1	0.0	100.C	0.0	56.8	55.6	58.9	58.3	62.0
3	AVAILABILITY OF MACHINE	0	0	C	0	15	6	0	1	22
		C.0	0.0	0.C	0.0	68.2	27.3	0.0	4.5	100.0
		0.0	0.0	0.C	0.0	40.5	16.7	0.0	2.1	11.0
	RESPONSES	17	0	6	0	37	36	56	48	200

TABLE 4.2.

TIME OF THRESHING

c) RICE

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH IOU	SINT HIOU	TOTAL
1	AT HARVEST	44	0	0	0	0	1	35	1	81
		54.3	0.0	0.C	0.0	0.0	1.2	43.2	1.2	100.0
		66.7	0.0	0.0	0.0	0.0	33.3	38.5	16.7	48.5
2	ACCORDING TO NEED	22	0	0	0	1	2	56	5	86
		25.6	0.0	0.C	0.0	1.2	2.3	65.1	5.8	100.0
		33.3	0.0	0.0	0.0	100.0	66.7	61.5	83.3	51.5
	RESPONSES	66	0	0	0	1	3	91	6	167

TABLE 4.2.

TIME OF THRESHING

d) MAIZE

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	AT HARVEST	0	0	0	0	3	17	36	16	72
		0.0	0.0	0.0	0.0	4.2	23.6	50.0	22.2	100.0
		0.0	0.0	0.0	0.0	100.0	33.3	57.1	18.0	34.8
2	ACCORDING TO NEED	0	0	1	0	0	23	27	73	124
		0.0	0.0	0.8	0.0	0.0	18.5	21.8	58.9	100.0
		0.0	0.0	100.0	0.0	0.0	45.1	42.9	82.0	59.9
3	AVAILABILITY OF THRESHER	0	0	0	0	0	11	0	0	11
		0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0
		0.0	0.0	0.0	0.0	0.0	21.6	0.0	0.0	5.3
	RESPONSES	0	0	1	0	3	51	63	89	207

C H A P T E R 5

STORAGE

5.1 QUANTITY STORED

Most of the cereal grains used for food are grown by the farmer himself. Since approximately 5% of our sample were urban families, it would seem that all farmers store the grain they produce for their own consumption (Table 5.1).

We found previously that the average family had four children. Assuming that the average number of people eating together is eight, then at 300 mg of cereals per day, each family would require approximately 600 kg (assuming no losses) until the following harvest. Of the 625 farmers who stored millet, only 16.8% stored more than 1 ton (Table 5.2). In July this figure dropped to 235. Although the class limits on the choices were too wide, this could indicate that several areas would be short of food before the next harvest. This was later observed at the Dagana and Louga regions.

Sorghum was more commonly found in the south with some sorghum being eaten around Dagana. This could represent purchased grain as the region may be too dry to grow sorghum.

Rice storage was primarily found at Dagana and Sedhiou. The rice stored in other areas was probably that by traders or by farmers who purchased it from traders.

Maize storage was primarily found at Nioro, Sedhiou and Sinthiou Malème; all in the southern part of Senegal.

Of the 734 families responding to the question, 559 (76.2%) considered their stock inadequate (Table 5.3). Of the 602 families that replied in July, 86.2% considered their stock inadequate. The hardest hit regions were Louga, Dagana and Sinthiou. In July, Bambey experienced the least difficulty with only 69.8% claiming that their stocks of grain were insufficient.

5.2 STORAGE PROBLEMS

When asking a farmer in one region whether or not he has storage problems, one must appreciate that his idea of a problem may be different than that of a farmer in another region.

Lack of storage facilities was a problem faced by more than half of the households at Dagana, Bambey and Sinthiou Malème (Table 5.4). It is interesting to note that all three regions are near ISRA stations. To these families, a lack of storage facilities may have meant a lack of improved facilities. The farmers at Dagana and Sinthiou may have heard about improved

TABLE 5.1.

STORAGE OF GRAINS

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SECH ICU	SINT HIOU	TOTAL
1	YES	86	93	99	93	95	92	100	94	752
		11.4	12.4	13.2	12.4	12.6	12.2	13.3	12.5	100.0
		89.6	93.0	99.0	93.0	95.0	92.0	100.0	94.9	94.6
2	NO	10	7	1	7	5	8	0	5	43
		23.3	16.3	2.3	16.3	11.6	18.6	0.0	11.6	100.0
		10.4	7.0	1.0	7.0	5.0	8.0	0.0	5.1	5.4
	RESPONSES	96	100	100	100	100	100	100	99	795

TABLE 5.2.

QUANTITY OF GRAIN IN STORES

a) MILLET

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRG	SEDHIOU	SINTHIOU	TOTAL
1	< 10	2	1	1	0	0	1	4	1	10
		20.0	10.0	10.0	0.0	0.0	10.0	40.0	10.0	100.0
		6.3	1.9	1.0	0.0	0.0	1.1	4.7	1.2	1.6
2	10-100	17	12	15	1	13	3	10	10	81
		21.0	14.8	18.5	1.2	16.0	3.7	12.3	12.3	100.0
		53.1	23.1	15.6	1.1	13.8	3.3	11.6	11.8	13.0
3	100 - 1000	13	36	57	69	67	69	58	60	429
		3.0	8.4	13.3	16.1	15.6	16.1	13.5	14.0	100.0
		40.6	69.2	59.4	76.7	71.3	76.7	67.4	70.6	68.6
4	>1000	0	3	23	20	14	17	14	14	105
		0.0	2.9	21.9	19.0	13.3	16.2	13.3	13.3	100.0
		0.0	5.8	24.0	22.2	14.9	18.9	16.3	16.5	16.8
	RESPONSES	32	52	96	90	94	90	86	85	625

TABLE 5.2.

QUANTITY OF GRAIN IN STORES

b) SORGHUM

		DAGA NA	LGUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH ICU	SINT HIOU	TOTAL
1	< 10	1	0	C	0	1	0	0	0	2
		50.0	0.0	0.C	0.0	50.0	0.0	0.0	0.0	100.0
		12.5	0.0	0.C	0.0	10.0	0.C	0.0	0.0	1.7
2	10 - 100	6	0	C	0	2	10	11	8	37
		16.2	0.C	0.C	0.0	5.4	27.0	29.7	21.6	100.0
		75.0	0.0	0.C	0.0	20.0	37.0	32.4	19.5	30.8
3	100 - 1000	1	0	C	0	5	15	23	28	72
		1.4	0.0	0.C	0.0	6.9	20.8	31.9	38.9	100.0
		12.5	0.0	0.C	0.0	50.0	55.6	67.6	68.3	60.0
4	>1000	0	0	C	0	2	2	0	5	9
		0.0	0.0	0.C	0.0	22.2	22.2	0.0	55.6	100.0
		0.0	0.0	0.C	0.0	20.0	7.4	0.0	12.2	7.5
	RESPONSES	8	0	C	0	10	27	34	41	120

TABLE 5.2.

QUANTITY OF GRAIN IN STORES

c) RICE

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR C	SEOH IGU	SINT HIOU	TOTAL
1	< 10	1	3	1	0	0	0	4	1	10
		10.0	30.0	10.0	0.0	0.0	0.0	40.0	10.0	100.0
		1.7	14.3	16.7	0.0	0.0	0.0	5.2	8.3	5.3
2	10 - 100	25	13	5	0	3	7	25	10	88
		28.4	14.8	5.7	0.0	3.4	8.0	28.4	11.4	100.0
		41.7	61.9	83.3	0.0	100.0	77.8	32.5	83.3	46.8
3	100 - 1000	27	5	0	0	0	0	41	1	74
		36.5	6.8	0.0	0.0	0.0	0.0	55.4	1.4	100.0
		45.0	23.8	0.0	0.0	0.0	0.0	53.2	8.3	39.4
4	> 1000	7	0	0	0	0	2	7	0	16
		43.8	0.0	0.0	0.0	0.0	12.5	43.8	0.0	100.0
		11.7	0.0	0.0	0.0	0.0	22.2	9.1	0.0	8.5
	RESPONSES	60	21	6	0	3	9	77	12	188

TABLE 5.2.

QUANTITY OF GRAIN IN STORES

d) MAIZE

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SECHIOU	SINTHIOU	TOTAL
1	< 10	0	0	1	0	0	0	0	2	3
		0.0	0.0	33.3	0.0	0.0	0.0	0.0	66.7	100.0
		0.0	0.0	100.0	0.0	0.0	0.0	0.0	4.2	2.5
2	10 - 100	0	1	0	0	0	14	12	25	52
		0.0	1.9	0.0	0.0	0.0	26.9	23.1	48.1	100.0
		0.0	100.0	0.0	0.0	0.0	37.8	38.7	52.1	44.1
3	100 - 1000	0	0	0	0	0	20	18	21	59
		0.0	0.0	0.0	0.0	0.0	33.9	30.5	35.6	100.0
		0.0	0.0	0.0	0.0	0.0	54.1	58.1	43.8	50.0
4	> 1000	0	0	0	0	0	3	1	0	4
		0.0	0.0	0.0	0.0	0.0	75.0	25.0	0.0	100.0
		0.0	0.0	0.0	0.0	0.0	8.1	3.2	0.0	3.4
	RESPONSES	0	1	1	0	0	37	31	48	118

TABLE 5.2.

QUANTITY OF GRAIN IN STORES

e) OTHER GRAINS

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SEDHIOU	SINTHIOU	TOTAL
1	< 10	1	0	1	1	0	0	0	4	7
		14.3	0.0	14.3	14.3	0.0	0.0	0.0	57.1	100.0
		20.0	0.0	4.0	100.0	0.0	0.0	0.0	7.8	6.3
2	10 - 100	2	16	8	0	2	3	0	16	47
		4.3	34.0	17.0	0.0	4.3	6.4	0.0	34.0	100.0
		40.0	69.6	32.0	0.0	100.0	100.0	0.0	31.4	42.3
3	100 - 1000	2	6	15	0	0	0	1	30	54
		3.7	11.1	27.8	0.0	0.0	0.0	1.9	55.6	100.0
		40.0	26.1	60.0	0.0	0.0	0.0	100.0	58.8	48.6
4	> 1000	0	1	1	0	0	0	0	1	3
		0.0	33.3	33.3	0.0	0.0	0.0	0.0	33.3	100.0
		0.0	4.3	4.0	0.0	0.0	0.0	0.0	2.0	2.7
	RESPONSES	5	23	25	1	2	3	1	51	111

TABLE 5.3.

SUFFICIENT STORES OF GRAIN

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICK C	SEOH ICU	SINT HIOU	TOTAL
1	YES	6	16	24	40	33	30	22	4	175
		3.4	9.1	13.7	22.9	18.9	17.1	12.6	2.3	100.0
		7.8	17.6	24.2	43.5	34.7	33.0	22.2	4.4	23.8
2	NO	71	75	75	52	62	61	77	86	559
		12.7	13.4	13.4	9.3	11.1	10.9	13.8	15.4	100.0
		92.2	82.4	75.8	56.5	65.3	67.0	77.8	95.6	76.2
	RESPONSES	77	91	99	92	95	91	99	90	734

storage methods and thus, although satisfied with their present method, felt they were missing something. The Bambey families probably had all seen the improved storage techniques at the research station.

The improved storage facilities can be one of several systems:

1. A circular bin built of cement block. This bin has a 3 ton capacity. It has an inside diameter of 1.5 m and a height of 2 m. It is extremely hard to build but it does provide protection against fire, theft, insects, molds, rodents, and water leakage. The cement wall is 12 cm thick which reduces the diurnal temperature fluctuation to 1C at the inside wall for the Bambey region (assuming an amplitude of 5C). The bin is hard to fill since it is loaded from the top.

2. A circular bin of 12 ton capacity. It has the small design as above but has an inside diameter of 2.5 m and a height of 3 m. It is difficult to build and even more difficult to empty or fill.

3. A "silo-magasin". This is a simple rectangular shed made of 20 x 20 x 40 cm concrete blocks. It can be built practically to any volume and can be built by any village mason. The only problem is that the silo-magasin is shared by 2-4 farmers which sometimes is not socially acceptable.

The problems with insects are more extreme in certain regions than others. This however is not always due to the fact that the problem really exists, rather it can be due more to the awareness that there are methods to reduce insect losses. The case of Bambey certainly could be just that. The lower percentage of insect problems at Louga could be due to the fact that most people in the region had already eaten their home-produced grain and were buying their food supplies from traders. As such, the storage period is often considerably shorter than one life cycle for most species. Also the farmers at Louga grew primarily millet as a food crop and the variety grown is extremely hard.

The problem of molds appears to be related to the problem of germination but neither appears to be related to rainfall patterns. This would indicate that in many cases the grain is put into storage after the end of the rainy season and is used before the rains the following year.

The problem with theft could be universal whereas that of fire would probably exist in the wooded or grassy areas. The question should have been divided to get more meaningful results.

TABLE 5.4.

STORAGE PROBLEMS

a) STORAGE FACILITIES

		DACA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIGR C	SEOH ICU	SINT HIOU	TOTAL
1	YES	44	5	27	5	2	26	2	67	178
		24.7	2.8	15.2	2.8	1.1	14.6	1.1	37.6	100.0
		51.8	5.5	27.3	71.4	2.1	28.6	2.0	72.0	27.0
2	NO	41	86	72	2	93	65	97	26	482
		8.5	17.8	14.9	0.4	19.3	13.5	20.1	5.4	100.0
		48.2	94.5	72.7	28.6	97.9	71.4	98.0	28.0	73.0
	RESPONSES	85	91	99	7	95	91	99	93	660

TABLE 5.4.

STORAGE PROBLEMS

b) INSECTS

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH ICU	SINT HIDU	TOTAL
1	YES	58	19	44	28	36	54	42	51	332
		17.5	5.7	13.3	8.4	10.8	16.3	12.7	15.4	100.0
		69.0	20.7	44.4	96.6	37.9	59.3	42.4	54.8	48.7
2	NO	26	73	55	1	59	37	57	42	350
		7.4	20.9	15.7	0.3	16.9	10.6	16.3	12.0	100.0
		31.0	79.3	55.6	3.4	62.1	40.7	57.6	45.2	51.3
	RESPONSES	84	92	99	29	95	91	99	93	682

TABLE 5.4.

STORAGE PROBLEMS

c) MOLDS

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORC	SEDHIOU	SINTHIOU	TOTAL
1	yes	26	0	19	0	20	23	34	75	197
		13.2	0.0	9.6	0.0	10.2	11.7	17.3	38.1	100.0
		31.3	0.0	19.6	0.0	21.1	25.6	34.3	80.6	30.4
2	no	57	92	78	0	75	67	65	18	452
		12.6	20.4	17.3	0.0	16.6	14.8	14.4	4.0	100.0
		68.7	100.0	80.4	0.0	78.9	74.4	65.7	19.4	69.6
RESPONSES		83	92	97	0	95	90	99	93	649

TABLE 5.4.

STORAGE PROBLEMS

d) GERMINATION

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH ICU	SINT HIOU	TOTAL
1	YES	24	0	15	0	13	5	16	72	145
		16.6	0.0	10.3	0.0	9.0	3.4	11.0	49.7	100.0
		28.9	0.0	15.3	0.0	13.7	5.5	16.2	77.4	22.2
2	NO	59	92	83	1	82	86	83	21	507
		11.6	18.1	16.4	0.2	16.2	17.0	16.4	4.1	100.0
		71.1	100.0	84.7	100.0	86.3	94.5	83.8	22.6	77.8
	RESPONSES	83	92	98	1	95	91	99	93	652

TABLE 5.4.

STORAGE PROBLEMS

e) THEFT OR FIRE

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICK C	SEDH ICU	SINT HIOU	TOTAL
1	YES	33	6	29	7	24	25	19	48	191
		17.3	3.1	15.2	3.7	12.6	13.1	9.9	25.1	100.0
		38.8	6.5	29.3	50.0	25.3	27.5	19.0	51.6	28.5
2	NO	52	87	70	7	71	66	81	45	479
		10.9	18.2	14.6	1.5	14.8	13.8	16.9	9.4	100.0
		61.2	93.5	70.7	50.0	74.7	72.5	81.0	48.4	71.5
	RESPONSES	85	93	95	14	95	91	100	93	670

TABLE 5.4.

STORAGE PROBLEMS

f) RODENTS

		DAGA NA	LUUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR G	SEDH IOU	SINT HIOU	TOTAL
1	YES	78	84	8C	82	59	75	94	23	575
		13.6	14.6	13.5	14.3	10.3	13.0	16.3	4.0	100.0
		92.9	90.3	80.8	100.0	62.8	82.4	94.0	24.7	78.1
2	NO	6	9	19	0	35	16	6	70	161
		3.7	5.6	11.8	0.0	21.7	9.9	3.7	43.5	100.0
		7.1	9.7	19.2	0.0	37.2	17.6	6.0	75.3	21.9
	RESPONSES	84	93	95	82	94	91	100	93	736

The rodent problem appeared in all regions, although only 24.7% of the farmers in Sinthiou reported problems. The percentage of farmers reporting more problems with molds and germination increased during the rainy season while the rodent problem decreased.

5.3 STORAGE OF MILLET

The traditional method of storing millet in a wicker basket "grenier" made from a local wood, Guiera senegalensis, was the most common method of millet storage in all regions except Nioro where 51.1% of the families stored grain in sacks (Table 5.5). This difference in storage method was primarily due to the availability of a millet thresher. The millet thresher pattern reflected itself in the storage techniques since regions other than Nioro threshed primarily according to need while the people at Nioro seemed to be more governed by the availability of a thresher. Although not as pronounced as Nioro, sack storage is also common at Sedhiou where 50% of the people threshed millet at harvest or when a threshes was available.

The question regarding storage of millet on the head as a stora storage method rather than the form in which the grain was stored was confusing to many enumerators and wives. From personal visits to the villages surveyed, it would be safe to say that many of the 127 answers for "on the head" should have in fact been "grenier", except for those at Sinthiou where facilities are lacking. The use of the improved cement bins developed at Bambey was not evident as a storage method. This would indicate that either there is a tremendous gap between research and extension or that the bins are not acceptable to the farmers in their present form due to increasing cement and galvanized sheeting costs.

The majority of the people stored millet in the unthreshed form without the use of insecticides (Table 5.6). There were several regional variations however. Of the 60 people reporting that they stored grain partially threshed, 56% came from the Dagana region. Although 54.6% of the people stored their millet in the threshed form at Khombole, only 35.1% used sack storage.

Whether or not the method of storing millet is satisfactory depends on whether or not there are any problems and also whether or not the people are familiar with improved storage techniques. This is especially true at Bambey where the influence of CNRA is readily visible (Table 5.7). The families have been exposed to at least one of the three improved types mentioned.

TABLE 5.5.

TYPES OF STORES FOR MILLET

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIGRC	SEDHIOU	SINTHIOU	TOTAL
1	ON THE HEAD	5	2	16	4	21	21	0	58	127
		3.9	1.6	12.6	3.1	16.5	16.5	0.0	45.7	100.0
		7.9	2.5	16.5	4.4	22.3	23.3	0.0	65.2	18.2
2	IN CROCKS	1	0	0	0	0	0	1	0	2
		50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	100.0
		1.6	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.3
3	MUD BLOCK BIN	11	0	1	0	0	0	11	0	23
		47.8	0.0	4.3	0.0	0.0	0.0	47.8	0.0	100.0
		17.5	0.0	1.0	0.0	0.0	0.0	11.7	0.0	3.3
4	GRENIER	33	46	40	86	59	14	43	20	341
		9.7	13.5	11.7	25.2	17.3	4.1	12.6	5.9	100.0
		52.4	56.8	41.2	95.6	62.8	15.6	45.7	22.5	48.9
5	CEMENT BINS	0	0	1	0	0	0	0	0	1
		0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
		0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.1
6	SACKS	12	32	34	0	14	46	33	11	182
		6.6	17.6	18.7	0.0	7.7	25.3	18.1	6.0	100.0
		19.0	39.5	35.1	0.0	14.9	51.1	35.1	12.4	26.1
9	OTHER	1	1	5	0	0	9	6	0	22
		4.5	4.5	22.7	0.0	0.0	40.9	27.3	0.0	100.0
		1.6	1.2	5.2	0.0	0.0	10.0	6.4	0.0	3.2
	RESPONSES	63	81	97	90	94	90	94	89	698

TABLE 5.6.

FORM IN WHICH MILLET IS STORED

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR G	SEDH IOU	SINT HIOU	TOTAL
1	UNTHRESHED/	16	48	41	80	62	31	42	75	395
	WITHOUT INSECTICIDE	4.1	12.2	10.4	20.3	15.7	7.8	10.6	19.0	100.0
		25.4	59.3	42.3	88.9	65.3	34.4	44.7	84.3	56.5
2	UNTHRESHED/WITH	3	1	1	8	0	4	1	1	19
	INSECTICIDES	15.8	5.3	5.3	42.1	0.0	21.1	5.3	5.3	100.0
		4.8	1.2	1.0	8.9	0.0	4.4	1.1	1.1	2.7
3	THRESHED/WITHOUT	10	32	53	2	14	43	50	8	212
	INSECTICIDES	4.7	15.1	25.0	0.9	6.6	20.3	23.6	3.8	100.0
		15.9	39.5	54.6	2.2	14.7	47.8	53.2	9.0	30.3
4	THRESHED/WITH	1	0	1	0	0	10	1	0	13
	INSECTICIDES	7.7	0.0	7.7	0.0	0.0	76.9	7.7	0.0	100.0
		1.6	0.0	1.0	0.0	0.0	11.1	1.1	0.0	1.9
5	PARTIALLY THRESHED/	32	0	1	0	19	2	0	5	59
	WITHOUT INSECTICIDES	54.2	0.0	1.7	0.0	32.2	3.4	0.0	8.5	100.0
		50.8	0.0	1.0	0.0	20.0	2.2	0.0	5.6	8.4
6	PARTIALLY THRESHED/	1	0	0	0	0	0	0	0	1
	WITH INSECTICIDES	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	RESPONSES	63	81	97	90	95	90	94	89	699

TABLE 5.7.

SATISFACTION WITH METHOD OF STORING MILLET

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIGR O	SEDH IOU	SINT HIOU	TOTAL
1	YES	48	35	76	17	66	53	37	84	416
		11.5	8.4	18.3	4.1	15.9	12.7	8.9	20.2	100.0
		76.2	43.2	78.4	18.9	69.5	58.9	39.4	94.4	59.5
2	NO	15	46	21	73	29	37	57	5	283
		5.3	16.3	7.4	25.8	10.2	13.1	20.1	1.8	100.0
		23.8	56.8	21.6	81.1	30.5	41.1	60.6	5.6	40.5
	RESPONSES	63	81	97	90	95	90	94	89	699

Seasonal changes were evident due to the increased use of sack for storage of millet which correlates directly with the grain purchases made by the farmer after depletion of his own stocks. To the authors' knowledge, all millet sold by traders or the national marketing board (ONCAD) is sold as threshed grain.

5.4 STORAGE OF SORGHUM

Sorghum is generally grown in Southern Senegal since it requires more moisture than millet during the growing season.

The sorghum grown in Senegal is of a loose panicle type which is extremely easy to thresh by stamping. This ease of threshing was confirmed by our results since none of the 200 respondents were willing to pay anything to have their grain machine-threshed.

Although 64% of the respondents thresh sorghum according to need, 38% of the families threshed sorghum at harvest or upon availability of the machine. Of this 38%, the majority were found in the southern part of the country. The people of the Dagana region place more importance on rice, thus sorghum is threshed as needed, while rice is done at harvest. These differences in threshing patterns are reflected in the storage methods at Dagana and Fissel, another region threshing sorghum according to need, the dominant storage method being in greniers, while in other sorghum growing regions such as Nioro and Sinthiou sack storage was more common (Table 5.8). As was the case in the storage of millet, a fair number (32.6%) of the families at Sédhiou used mud-block silos to store sorghum. The use of these mud-block bins is probably due to the ease of obtaining the necessary laterite to form the blocks. The mud-block bins do provide an adequate barrier against insects and water and provided that the grain is put into the store at a low moisture content, losses can be quite low. From the work done at CNRA by one of the authors (GY), it was found that in the storage of sorghum for 30 months, there was 2% less loss in the mud-block structure than in one in which the sides allowed insects to pass freely.

For the entire survey the most common form in which sorghum was stored was in the unthreshed state (47.3%)(Table 5.9). More than 50% of the farmers at Dagana (52.6%) and Sinthiou (79.6%) stored their sorghum in this form, while the threshed form was indicated by the majority of families at Nioro (75.0%) and Sédhiou (68.3%). The partial threshing of sorghum was only practiced at Fissel where 60.9% used that form of storage while 30.1% of the families in the same region stored their grain in the unthreshed form.

In all regions where sorghum is grown the majority of families were satisfied with their methods of storing sorghum (Table 5.10). There was an increased percentage in the number of farmers who stored sorghum in sacks in July compared to March. This was due to the purchase of sorghum grain for food and to the availability of time to hand-thresh the heads.

5.5 STORAGE OF MAIZE

Maize is primarily grown in southern Senegal since the northern part of the country is far too dry for its production. The introduction of hybrid varieties has been one of the reasons for the popularity of this crop. With some hybrid varieties, yields of 5 tonnes per hectare are not uncommon in farmers' fields. However, the government has not yet developed a large enough seed multiplication program to meet the growing demand.

Maize storage methods are also dependent on threshing methods. Maize shellers are available at Nioro and Sédhiou, thus many farmers (Table 5.11) in these regions use sack storage. There was some evidence of the use of cribs both for drying and storage, as indicated by the method "other". In some parts of southern Senegal maize is stored on the cob and hung over a kitchen fire in a home. This dries the grain and the smoke tends to keep the insects away. The storage of maize on the cob was practiced primarily in Sinthiou (93.8% of the families used the method).

Where shellers were avilable, maize was generally stored shelled. At Nioro the practice was followed by 74.4% of the families at Sédhiou, 82.4% of the families followed the same practice (Table 5.12). In pite of the fact that use of insecticides has been emphasized when using cribs, the practice is not that common.

The families at Nioro (62.8%) and Sinthiou (95.0%) were satisfied with their method of storing maize while the majority (78.0%) at Sédhiou were not (Table 5.13). This difference is primarily due to climate, since the maize may ripen before the end of the rainy season. Mold problems are therefore quite common.

There were few changes in storage methods between March and July, except that the percentage of the number of cases of maize stored shelled had increased.

TABLE 5.8.

TYPES OF STORAGE USED FOR SORGHUM

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORC	SEDHIOU	SINTHIOU	TOTAL
1	ON THE HEAD	0	0	C	0	10	3	1	19	33
		0.0	0.0	0.0	0.0	30.3	9.1	3.0	57.6	100.0
		0.0	0.0	0.0	0.0	43.5	9.4	2.3	38.8	19.8
2	IN CROCKS	1	0	C	0	0	0	1	0	2
		50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	100.0
		5.3	0.0	0.0	0.0	0.0	0.0	2.3	0.0	1.2
3	MUD BLOCK SILO	2	0	C	0	0	0	14	0	16
		12.5	0.0	0.0	0.0	0.0	0.0	87.5	0.0	100.0
		10.5	0.0	0.0	0.0	0.0	0.0	32.6	0.0	9.6
4	GRENIER	10	0	C	0	13	0	11	1	35
		28.6	0.0	0.0	0.0	37.1	0.0	31.4	2.9	100.0
		52.6	0.0	0.0	0.0	56.5	0.0	25.6	2.0	21.0
6	SACKS	5	1	C	0	0	23	13	29	71
		7.0	1.4	0.0	0.0	0.0	32.4	18.3	40.8	100.0
		26.3	100.0	0.0	0.0	0.0	71.9	30.2	59.2	42.5
9	OTHER	1	0	C	0	0	6	3	0	10
		10.0	0.0	0.0	0.0	0.0	60.0	30.0	0.0	100.0
		5.3	0.0	0.0	0.0	0.0	18.8	7.0	0.0	6.0
	RESPONSES	19	1	C	0	23	32	43	49	167

TABLE 5.9.

FORM IN WHICH SORGHUM IS STORED

	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SEDHIOU	SINTHIOU	TOTAL
1 UNTHRESHED/WITHOUT INSECTICIDES	10	0	0	0	9	4	13	39	75
	13.3	0.0	0.0	0.0	12.0	5.3	17.3	52.0	100.0
	52.6	0.0	0.0	0.0	39.1	12.5	31.7	79.6	45.5
2 UNTHRESHED/WITH INSECTICIDES	3	0	0	0	0	0	0	0	3
	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
3 THRESHED/WITHOUT INSECTICIDES	5	1	0	0	0	24	28	10	68
	7.4	1.5	0.0	0.0	0.0	35.3	41.2	14.7	100.0
	26.3	100.0	0.0	0.0	0.0	75.0	68.3	20.4	41.2
4 THRESHED/WITH INSECTICIDES	1	0	0	0	0	4	0	0	5
	20.0	0.0	0.0	0.0	0.0	80.0	0.0	0.0	100.0
	5.3	0.0	0.0	0.0	0.0	12.5	0.0	0.0	3.0
5 PARTIALLY THRESHED/ WITHOUT INSECTICIDES	0	0	0	0	14	0	0	0	14
	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
	0.0	0.0	0.0	0.0	60.9	0.0	0.0	0.0	8.5
RESPONSES	19	1	0	0	23	32	41	49	165

TABLE 5.10.

SATISFACTION WITH METHOD OF STORING SORGHUM

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SECHICU	SINTHIOU	TOTAL
1	YES	16	0	C	0	14	18	23	45	116
		13.8	0.0	0.C	0.0	12.1	15.5	19.8	38.8	100.0
		84.2	0.0	0.C	0.0	60.9	56.3	54.8	91.8	69.9
2	NO	3	1	C	0	9	14	19	4	50
		6.0	2.0	0.C	0.0	18.0	28.0	38.0	8.0	100.0
		15.8	100.0	0.0	0.0	39.1	43.8	45.2	8.2	30.1
	RESPONSES	19	1	C	0	23	32	42	49	166

TABLE 5.11

TYPES OF STORES USED FOR MAIZE

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOK C	SEDH IOU	SINT HIOU	TOTAL
1	ON THE COB	0	0	C	0	0	6	6	75	87
		0.0	0.0	0.0	0.0	0.0	6.9	6.9	86.2	100.0
		0.0	0.0	0.0	0.0	0.0	14.0	11.8	93.8	49.2
2	IN CROCKS	0	0	C	0	1	0	3	0	4
		0.0	0.0	0.0	0.0	25.0	0.0	75.0	0.0	100.0
		0.0	0.0	0.0	0.0	33.3	0.0	5.9	0.0	2.3
3	MUD-BLOCK SILO	0	0	C	0	0	0	8	0	8
		0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0
		0.0	0.0	0.0	0.0	0.0	0.0	15.7	0.0	4.5
4	GRENIER	0	0	C	0	0	1	2	2	5
		0.0	0.0	0.0	0.0	0.0	20.0	40.0	40.0	100.0
		0.0	0.0	0.0	0.0	0.0	2.3	3.9	2.5	2.8
6	SACKS	0	0	0	0	0	31	29	3	63
		0.0	0.0	0.0	0.0	0.0	49.2	46.0	4.8	100.0
		0.0	0.0	0.0	0.0	0.0	72.1	56.9	3.7	35.6
9	OTHER	0	0	C	0	2	5	3	0	10
		0.0	0.0	0.0	0.0	20.0	50.0	30.0	0.0	100.0
		0.0	0.0	0.0	0.0	66.7	11.6	5.9	0.0	5.6
	RESPONSES	0	0	0	0	3	43	51	80	177

TABLE 5.12

FORM IN WHICH MAIZE WAS STORED

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SECHIOU	SINTHIOU	TOTAL
1	UNSHELLED/WITHOUT INSECTICIDES	0	0	C	0	1	8	7	74	90
		0.0	0.0	0.C	0.0	1.1	8.9	7.8	82.2	100.0
		0.0	0.0	0.0	0.0	50.0	18.6	13.7	92.5	51.1
2	UNSHELLED/WITH INSECTICIDES	0	0	C	0	1	0	2	2	5
		0.0	0.0	0.C	0.0	20.0	0.0	40.0	40.0	100.0
		0.0	0.0	0.0	0.0	50.0	0.0	3.9	2.5	2.8
3	SHELLED/WITHOUT INSECTICIDES	0	0	C	0	0	32	42	4	78
		0.0	0.0	0.C	0.0	0.0	41.0	53.8	5.1	100.0
		0.0	0.0	0.C	0.0	0.0	74.4	82.4	5.0	44.3
4	SHELLED/WITH INSECTICIDES	0	0	C	0	0	3	0	0	3
		0.0	0.0	0.C	0.0	0.0	100.0	0.0	0.0	100.0
		0.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0	1.7
	RESPONSES	0	0	0	0	2	43	51	80	176

TABLE 5.13

SATISFACTION WITH METHOD OF STORING MAIZE

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	YES	0	0	C	0	1	27	11	76	115
		0.0	0.0	0.C	0.0	0.9	23.5	9.6	66.1	100.0
		0.0	0.0	0.C	0.0	50.0	62.8	22.0	95.0	65.7
2	NO	0	0	C	0	1	16	39	4	60
		0.0	0.0	0.C	0.0	1.7	26.7	65.0	6.7	100.0
		0.0	0.0	0.C	0.0	50.0	37.2	78.0	5.0	34.3
	RESPONSES	0	0	C	0	2	43	50	80	175

5.6 STORAGE OF RICE

Rice is grown primarily in the Senegal River delta and in the
Casamance. It is quite likely that other families reporting that
they stored rice were referring to rice that was purchased. The
families at Dagana stored rice almost exclusively in sacks (86.7%),
while the storage methods at Sédhiou were more varied (Table 5.14).

There appears to be some discrepancy in the results between
Tables 5.14 and 5.15, since they suggest that a certain number of
families store unthreshed paddy in sacks in the Dagana region.
The situation at Sédhiou was more clear cut, since threshed rice
(62.1%) was the most common form (Table 5.15).

Dagana, having an extremely dry climate, would lend itself
better to rice storage than Sédhiou, a humid climate. This was
well illustrated in Table 5.16 where the majority of farmers at
Dagana (93.3%) were satisfied with their method of storing rice
while only 45.5% of the families at Sédhiou were satisfied.

5.7 PHYSICAL MEANS OF PROTECTION AGAINST INSECTS

The principle in mixing two grains of different sizes is
practiced because it gives more grain stored per unit volume.
This increase in density also provides a physical barrier thus
blocking insects from penetrating the interior of a grain bulk.
The mixing of two grains, although practiced by some (Table 5.17)
was not that common since both grains should be in the threshed form.
Generally, work on the cash crop of the region does not allow the
farmer this opportunity.

Mixing of sand or ash was only practiced at Dagana and
Khombole. There did not appear to be any problems in the separating
out of the grain.

5.8 SUITABILITY OF STORAGE TECHNIQUES - A NATIONAL VIEW

In terms of what was reflected on a national basis (Table 5.18),
we found that due to the lack of interest in the introduction of
improved methods, there should be a continued effort in research
on the improvement of traditional storage methods.

TABLE 5.14

TYPES OF STORES USED FOR RICE

	DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR C	SEDH IOU	SINT HIOU	TOTAL
1 ON THE HEAD	1	0	C	0	0	0	0	1	2
	50.0	0.0	0.C	0.0	0.0	0.0	0.0	50.0	100.0
	1.7	0.0	0.C	0.0	0.0	0.0	0.0	5.9	1.0
2 IN CROCKS	0	0	C	0	0	0	5	0	5
	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0
	0.0	0.0	0.C	0.0	0.0	0.0	5.7	0.0	2.5
3 MUD BLOCK SILO	4	0	C	0	0	0	11	0	15
	26.7	0.0	0.C	0.0	0.0	0.0	73.3	0.0	100.0
	6.7	0.0	0.C	0.0	0.0	0.0	12.5	0.0	7.5
4 GRENIERS	1	0	C	0	0	0	28	0	29
	3.4	0.0	0.C	0.0	0.0	0.0	96.6	0.0	100.0
	1.7	0.0	0.C	0.0	0.0	0.0	31.8	0.0	14.6
6 SACKS	52	18	6	0	2	8	41	16	143
	36.4	12.6	4.2	0.0	1.4	5.6	28.7	11.2	100.0
	86.7	100.0	100.C	0.0	100.0	100.0	46.6	94.1	71.9
9 OTHER	2	0	C	0	0	0	3	0	5
	40.0	0.0	0.C	0.0	0.0	0.0	60.0	0.0	100.0
	3.3	0.0	0.C	0.0	0.0	0.0	3.4	0.0	2.5
RESPONSES	60	18	6	0	2	8	88	17	199

TABLE 5.15

FORM IN WHICH RICE IS STORED

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHICU	SINTHIOU	TOTAL
1	UNTHRESHED/WITHOUT INSECTICIDES	16	0	C	0	1	0	30	1	48
		33.3	0.0	0.C	0.0	2.1	0.0	62.5	2.1	100.0
		26.7	0.0	0.C	0.0	50.0	0.0	34.5	5.9	24.2
2	UNTHRESHED/WITH INSECTICIDES	1	0	C	0	0	0	2	1	4
		25.0	0.0	0.C	0.0	0.0	0.0	50.0	25.0	100.0
		1.7	0.0	0.C	0.0	0.0	0.0	2.3	5.9	2.0
3	THRESHED/WITHOUT INSECTICIDES	42	18	6	0	1	8	54	11	140
		30.0	12.9	4.3	0.0	0.7	5.7	38.6	7.9	100.0
		70.0	100.0	100.0	0.0	50.0	100.0	62.1	64.7	70.7
4	THRESHED/WITH INSECTICIDES	0	0	C	0	0	0	1	0	1
		0.0	0.0	0.C	0.0	0.0	0.0	100.0	0.0	100.0
		0.0	0.0	0.C	0.0	0.0	0.0	1.1	0.0	0.5
5	PARTIALLY THRESHED/ WITHOUT INSECT.	1	0	C	0	0	0	0	4	5
		20.0	0.0	0.C	0.0	0.0	0.0	0.0	80.0	100.0
		1.7	0.0	0.C	0.0	0.C	0.C	0.0	23.5	2.5
	RESPONSES	60	18	6	0	2	8	87	17	198

TABLE 5.16

SATISFACTION WITH METHOD OF STORING RICE

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR G	SECH IOU	SINT HIOU	TOTAL
1	YES	56	13	6	0	2	8	40	17	142
		35.4	9.2	4.2	0.0	1.4	5.6	28.2	12.0	100.0
		93.3	72.2	100.0	0.0	100.0	100.0	45.5	100.0	71.4
2	NO	4	5	0	0	0	0	48	0	57
		7.0	8.8	0.0	0.0	0.0	0.0	84.2	0.0	100.0
		6.7	27.8	0.0	0.0	0.0	0.0	54.5	0.0	28.6
	RESPONSES	60	18	6	0	2	8	88	17	199

TABLE 5.17.

OTHER STORAGE METHODS

	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTH	TOTAL
Mixing of 2 or more grains	6	36	6	12	42	30	0	4	136
Mixing of grains with sand	12	1	41	0	0	0	0	0	54
Sepraration of sand by sieves	12	1	41	0	0	0	0	0	54
Separation of sand by wind	1	0	21	0	0	0	0	0	22
Separation of sand by other methods	1	0	12	0	0	0	0	0	13
Mixing of wood ash and grain	31	1	13	0	0	0	2	1	48
Separation of ash by sieves	30	1	13	0	0	0	1	0	45
Separation of ash by wind	6	0	7	0	0	0	0	1	14
Separation of ash by other methods	1	0	4	0	0	0	0	0	5

TABLE 5.18.

SUITABILITY OF STORAGE METHODS

GRAIN	ON THE HEAD		MUD-BLOCK SILOS		GRENIER		CEMENT BINS		SACKS		CROCKS		OTHERS	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
MILLET	90	35	15	8	163	146	1	0	99	65	2	0	11	11
SORGHUM	28	5	13	3	21	14	0	0	43	23	2	0	6	4
RICE	2	0	11	4	24	5	0	0	90	41	4	0	4	1
MAIZE	72	12	5	3	3	2	0	0	24	38	2	1	6	4

S = SATISFACTORY

NS = NON SATISFACTORY

CHAPTER 6

GRAIN PROCESSING

6.1 SOURCE OF GRAIN FOR PROCESSING

The majority of farmers used the grain they produced on their farm for processing. When that supply was depleted, they tried to purchase enough to meet their requirements (Table 6.1). The team leaders felt that trading and giving of gifts was a common practice to obtain the grain necessary for processing. In fact, this was not the case, rather the grain is sometimes traded to purchase other goods. There was, however, some trading reported at Dagana (11 cases), Louga (21 cases), Nioro (8 cases), and Sédhiou (10 cases).

In terms of seasonal changes between March and July, the authors found that as the number of purchases increased, the number of trading transactions decreased. Of the families responding in both periods, 134 who were eating home-produced grain in March were using another source in July. There were 160 families buying grain in July who did not buy grain in March.

6.2 RESPONSIBILITY FOR STORES

The responsibility of the grain stores lies with the head of the compound, the head of the household or the wife (Table 6.2). These duties were however region-dependent. At Dagana the duties were shared between the head of the compound (48.4%) and the wife (47.3%); at Louga the head of the household assumed this responsibility (56.8%). At Khombole, Bambey and Sédhiou the tasks were shared by the head of the household and the wife. Unlike the other two regions however, the wife played a more important role at Khombole. At both Nioro and Sinthiou the responsibilities were shared between the head of the compound and the head of the household. This data is probably misleading since the head of the compound was not excluded from our sample. Combining the two categories we found that the woman was responsible in nearly half the cases only at Dagana and Khombole. Since the people from Dagana do not rely completely on agriculture and since many families at Khombole could have the head involved in activities away from home, this is easy to explain.

The right to sell was governed by the man (Table 6.3). The woman had this right at Khombole (42.5%) and at Fissel (30.9%) and to a lesser extent at Dagana, Louga and Bambey. The woman practically never had this right at Nioro, Sédhiou or Sinthiou. There may be some ethnic difference here although Nioro families were primarily of Ouoloff origin as were families at the first five regions.

TABLE 6.1.

SOURCE OF GRAIN FOR FOOD

	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTH.	TOTAL
PRODUCED ON FARM	60	54	81	84	80	87	96	78	620
PURCHASE	47	66	37	14	22	33	6	53	278
GIFT	0	1	2	2	1	6	2	2	16
BARTER	11	21	0	0	0	8	10	0	50

TABLE 6.2.

RESPONSIBILITY OF GRAIN STORES

	DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEOH ICU	SINT HIOU	TOTAL
1 HEAD OF COMPOUND	45	21	21	10	51	33	15	48	244
	18.4	8.6	8.6	4.1	20.9	13.5	6.1	19.7	100.0
	48.4	22.1	21.2	10.3	52.6	35.9	15.0	49.0	31.6
2 HEAD OF HOUSEHOLD	3	54	31	54	13	53	47	31	286
	1.0	18.9	10.8	18.9	4.5	18.5	16.4	10.8	100.0
	3.2	56.8	31.3	55.7	13.4	57.6	47.0	31.6	37.1
3 WIFE	44	19	42	32	32	4	32	18	223
	19.7	8.5	18.8	14.3	14.3	1.8	14.3	8.1	100.0
	47.3	20.0	42.4	33.0	33.0	4.3	32.0	18.4	28.9
4 OTHERS	1	1	5	1	1	2	6	1	18
	5.6	5.6	27.8	5.6	5.6	11.1	33.3	5.6	100.0
	1.1	1.1	5.1	1.0	1.0	2.2	6.0	1.0	2.3
RESPONSES	93	95	95	97	97	92	100	98	771

TABLE 6.3.

WHO HAS THE RIGHT TO SELL GRAIN

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR G	SEDH IOU	SINT HIOU	TOTAL
1	HEAD OF COMPOUND	69	16	7	8	49	26	13	25	213
		32.4	7.5	3.3	3.8	23.0	12.2	6.1	11.7	100.0
		80.2	24.2	8.7	8.7	60.5	29.2	15.7	39.1	33.2
2	HEAD OF HOUSEHOLD	3	39	37	68	7	60	67	35	316
		0.9	12.3	11.7	21.5	2.2	19.0	21.2	11.1	100.0
		3.5	59.1	46.2	73.9	8.6	67.4	80.7	54.7	49.3
3	WIFE	14	11	34	15	25	1	3	3	106
		13.2	10.4	32.1	14.2	23.6	0.9	2.8	2.8	100.0
		16.3	16.7	42.5	16.3	30.9	1.1	3.6	4.7	16.5
4	OTHERS	0	0	2	1	0	2	0	1	6
		0.0	0.0	33.3	16.7	0.0	33.3	0.0	16.7	100.0
		0.0	0.0	2.5	1.1	0.0	2.2	0.0	1.6	0.9
	RESPONSES	86	66	8C	92	81	89	83	64	641

The woman was responsible for the decision to sell in fewer cases than in the responsibility for the right to sell. Apart from Khombole, this task was carried primarily by the man (Table 6.4).

In the construction of three-way tables, we found that in 166 cases the head of the compound was responsible for the grain stores, had the right to sell grain and made the decision when to sell grain. In 237 cases the head of the household had this same responsibility, while in 68 cases it was the woman. In 52 cases the head of the household had the right to sell grain but the wife was responsible for the grain store and decided when to sell grain. The same duties were shared between the head of the compound and the wife in 37 cases.

Of the 679 families who replied to the questions in both March and July, there was only a 9.0% change in responsibility for the grain store. Similarly of the 558 families responding, only 4.3% indicated changes in who had the right to sell, and only 3.7% of the 569 responses changed in who had the right to decide when to sell. This indicates that the decision-making process is constant. This could be an asset if any future action were to be taken.

6.3 MARKETING OF GRAIN

In spite of the fact that a marketing structure exists for cereals, only a few farmers sell cereals. The sale of cereals, verified by discussion with certain families, only takes place when an adequate food supply is certain and/or when revenue from the cash sale is required. Generally, only groundnuts are sold for this revenue (Table 6.5 and 6.6).

Cereals can be sold by one of several means; through the national marketing board, through markets or traders, or by selling to one's father. There were some cases where some of the money earned from the sale of unprocessed goods was used to buy a processed item made from the same goods (Table 6.7). Two interesting points came out. First, there was an increase in the number of families buying tomato paste after selling tomatoes during July. More important, there was an increase in the purchase of groundnut oil by those selling groundnuts. This could indicate late sales of groundnuts thus giving an added revenue, or it could indicate that the number of families who might be making groundnut oil at home had decreased since the woman's time was more restricted.

TABLE 6.4.

WHO DECIDES WHEN TO SELL GRAIN

		DAGA NA	LOUGA	KHOM BOLE	BAMB EY	FISS EL	NIOR C	SEDH IOU	SINT HIOU	TOTAL
1	HEAD OF COMPOUND	70	16	1C	7	58	29	23	25	238
		29.4	6.7	4.2	2.9	24.4	12.2	9.7	10.5	100.0
		81.4	23.9	12.7	7.7	72.5	32.6	23.0	39.7	36.3
2	HEAD OF HOUSEHOLD	3	43	39	69	15	57	74	34	334
		0.9	12.9	11.7	20.7	4.5	17.1	22.2	10.2	100.0
		3.5	64.2	49.4	75.8	18.8	64.0	74.0	54.0	51.0
3	WIFE	13	8	29	14	7	1	3	2	77
		16.9	10.4	37.7	18.2	9.1	1.3	3.9	2.6	100.0
		15.1	11.9	36.7	15.4	8.7	1.1	3.0	3.2	11.8
4	OTHER	0	0	1	1	0	2	0	2	6
		C.0	0.0	16.7	16.7	0.0	33.3	0.0	33.3	100.0
		0.0	0.0	1.3	1.1	0.0	2.2	0.0	3.2	0.9
	RESPONSES	86	67	79	91	80	89	100	63	655

TABLE 6.5.

PLACE OF SALE OF GRAINS

	ONCAD	MARKET	TRADERS	FATHER	OTHERS	TOTAL
MILLET	115	79	34	60	1	289
SORGHUM	15	22	13	28	0	78
RICE	43	5	21	25.	0	94
MAIZE	11	4	13	36	0	64
GROUNDNUTS	559	6	1	3	2	571
OTHER	6	78	5	18	16	123

TABLE 6.6.

PERIOD OF SALE OF GRAIN - MARCH 1976

	AT HARVEST	ACCORDING TO NEED	OTHER	TOTAL
MILLET	43	232	4	279
SORGHUM	4	67	1	72
RICE	42	51	0	93
MAIZE	9	45	1	55
GROUNDNUTS	520	19	23	562
OTHER	24	76	8	108

TABLE 6.7

PURCHASE OF PROCESSED GOODS THAT COULD BE MADE AT HO

	MARCH 1976		JULY 1976	
	NUMBER	%	NUMBER	%
SELL PADDY BUY RICE	8	1.1	8	1.0
SELL MILLET BUY COUSCOUS	11	1.6	16	2.1
SELL PEANUTS BUY OIL	187	27.5	290	37.3
SELL PEANUTS BUY PEANUT BUTTER	25	3.6	30	3.9
SELL CRUDE PALM OIL BUY PALM OIL	19	2.9	26	3.5
SELL TOMATOES BUY TOMATO SAUCE	35		64	8.3

6.4 RECEIPT OF THE GRAIN FOR FOOD PREPARATION

In the majority of cases, the woman received the grain used for food preparation (Table 6.8). In 615 cases the woman received the grain in both March and July (86.5% of the responses). There were 65 cases where another person received the grain in July. This could be due to the wife's working in the fields. Seasonal changes were similar in all regions.

The delivery of the grain to the wife varies by region, but was generally done daily (Table 6.9). In all regions except Sédhiou and Dagana, daily delivery accounts for more than 60% of the cases. The families at Dagana varied in that delivery of grain was made at least once a week in 95% of the cases. The Sédhiou families practiced delivery of food grains primarily either every 2 or 3 days or once a week. Sédhiou would therefore be a suitable region to introduce a mechanical milling process since a milling system would not lend itself to daily delivery. There would be a need to re-educate or re-orient the families using the daily delivery system before any type of milling system would be possible in the other regions.

Generally, most families received between 1 and 10 kg of grain daily (Table 6.10). When the grain stores diminished in July, there was a change in distribution patterns of grain (66 families). There did not appear to be any correlation between the method of distribution and the quantity of grain given out for daily use, rather the quantity was a function of the number of people eating the meal.

In all regions except Fissel, the grain was supplied in the threshed form (Table 6.11). Since millet is the common grain used and is stored on the head, this would indicate that either the grain threshing prior to use is not considered to follow the grain delivery, or that the question was misunderstood.

6.5 GRAIN PROCESSING

Most of the grain received for processing was millet (81.2%) although regional preferences did exist (Table 6.12). Sorghum and rice were received both at Dagana and Sédhiou while 19.4% of the families at Nioro used maize or sorghum. The changes between March and July were due to shortage of home-grown grain. There were 68 cases where families did not eat millet in July although they did in March, as well as 43 cases in the reverse sense. Both situations were due to shortage of the first choice of cereal grain.

TABLE 6.8

WHO RECEIVES THE GRAIN FOR FOOD PREPARATION

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR G	SECH ICU	SINT HIOU	TOTAL
1	WIFE	79	92	8C	94	82	81	84	82	674
		11.7	13.6	11.9	13.9	12.2	12.0	12.5	12.2	100.0
		79.0	92.9	80.C	95.9	82.0	81.0	84.0	82.8	84.7
2	ELDEST DAUGHTER	11	3	11	2	10	10	6	1	54
		20.4	5.6	20.4	3.7	18.5	18.5	11.1	1.9	100.0
		11.0	3.0	11.C	2.0	10.0	10.0	6.0	1.0	6.8
3	MOTHER-IN-LAW	0	0	C	0	3	3	0	7	13
		0.0	0.0	0.C	0.0	23.1	23.1	0.0	53.8	100.0
		0.0	0.0	0.C	0.0	3.0	3.0	0.0	7.1	1.6
4	OTHER	10	4	9	2	5	6	10	9	55
		18.2	7.3	16.4	3.6	9.1	10.9	18.2	16.4	100.0
		10.0	4.0	9.C	2.0	5.0	6.0	10.0	9.1	6.9
	RESPCNSES	100	99	100	98	100	100	100	99	796

TABLE 6.9.

DELIVERING OF GRAINS FOR CONSUMPTION

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SEDHIOU	SINTHIOU	TOTAL
1	EVERY DAY	36	62	63	89	86	75	9	87	507
		7.1	12.2	12.4	17.6	17.0	14.8	1.8	17.2	100.0
		36.0	62.0	63.0	89.9	86.0	75.0	9.0	88.8	63.6
2	EVERY 2 DAYS	25	12	20	6	11	16	29	8	127
		19.7	9.4	15.7	4.7	8.7	12.6	22.8	6.3	100.0
		25.0	12.0	20.0	6.1	11.0	16.0	29.0	8.2	15.9
3	EVERY 3 DAYS	11	6	8	4	2	3	39	2	75
		14.7	8.0	10.7	5.3	2.7	4.0	52.0	2.7	100.0
		11.0	6.0	8.0	4.0	2.0	3.0	39.0	2.0	9.4
4	ONCE A WEEK	23	19	4	0	0	1	23	1	71
		32.4	26.8	5.6	0.0	0.0	1.4	32.4	1.4	100.0
		23.0	19.0	4.0	0.0	0.0	1.0	23.0	1.0	8.9
5	TWICE A WEEK	0	1	3	0	0	0	0	0	4
		0.0	25.0	75.0	0.0	0.0	0.0	0.0	0.0	100.0
		0.0	1.0	3.0	0.0	0.0	0.0	0.0	0.0	0.5
6	ONCE A MONTH	5	0	1	0	1	4	0	0	11
		45.5	0.0	9.1	0.0	9.1	36.4	0.0	0.0	100.0
		5.0	0.0	1.0	0.0	1.0	4.0	0.0	0.0	1.4
7	OTHER	0	0	1	0	0	1	0	0	2
		0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	100.0
		0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.3
	RESPONSES	100	100	100	99	100	100	100	98	797

TABLE 6.10

QUANTITY OF GRAIN RECEIVED BY THE WOMAN

	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICK	SEDHIOU	SINTHIOU	TOTAL
1 1 - 5 kg	41	74	67	74	80	36	50	58	480
	8.5	15.4	14.0	15.4	16.7	7.5	10.4	12.1	100.0
	41.0	74.0	67.0	74.7	80.0	36.0	50.0	59.2	60.2
2 6 - 10 kg	41	25	23	22	20	53	32	30	246
	16.7	10.2	9.3	8.9	8.1	21.5	13.0	12.2	100.0
	41.0	25.0	23.0	22.2	20.0	53.0	32.0	30.6	30.9
3 11 - 15 kg	7	1	6	2	0	9	8	5	38
	18.4	2.6	15.8	5.3	0.0	23.7	21.1	13.2	100.0
	7.0	1.0	6.0	2.0	0.0	9.0	8.0	5.1	4.8
4 16 - 20 kg	8	0	2	1	0	2	5	4	22
	36.4	0.0	9.1	4.5	0.0	9.1	22.7	18.2	100.0
	8.0	0.0	2.0	1.0	0.0	2.0	5.0	4.1	2.8
5 More than 20 kg	3	0	2	0	0	0	5	1	11
	27.3	0.0	18.2	0.0	0.0	0.0	45.5	9.1	100.0
	3.0	0.0	2.0	0.0	0.0	0.0	5.0	1.0	1.4
RESPONSES	100	100	100	99	100	100	100	98	797

TABLE 6.11

FORM GRAIN IS SUPPLIED

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH ICU	SINT HIOU	TOTAL
1	THRESHED	84	84	75	80	29	78	75	70	575
		14.6	14.6	13.0	13.9	5.0	13.6	13.0	12.2	100.0
		84.0	84.0	75.0	80.8	29.0	78.0	75.0	72.9	72.3
2	UNTHRESHED	16	16	25	19	71	22	25	26	220
		7.3	7.3	11.4	8.6	32.3	10.0	11.4	11.8	100.0
		16.0	16.0	25.0	19.2	71.0	22.0	25.0	27.1	27.7
	RESPONSES	100	100	100	99	100	100	100	96	795

TABLE 6.12

TYPE OF GRAIN DEHULLED YESTERDAY

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SEDHIOU	SINTHIOU	TOTAL
1	MILLET	47	81	98	97	96	79	50	60	608
		7.7	13.3	16.1	16.0	15.8	13.0	8.2	9.9	100.0
		47.5	97.6	98.0	99.0	96.0	80.6	52.1	80.0	81.2
2	SORGHUM	16	0	1	1	2	10	16	5	51
		31.4	0.0	2.0	2.0	3.9	19.6	31.4	9.8	100.0
		16.2	0.0	1.0	1.0	2.0	10.2	16.7	6.7	6.8
3	MAIZE	1	0	0	0	0	9	4	1	15
		6.7	0.0	0.0	0.0	0.0	60.0	26.7	6.7	100.0
		1.0	0.0	0.0	0.0	0.0	9.2	4.2	1.3	2.0
4	OTHERS	35	2	1	0	2	0	26	9	75
		46.7	2.7	1.3	0.0	2.7	0.0	34.7	12.0	100.0
		35.4	2.4	1.0	0.0	2.0	0.0	27.1	12.0	10.0
	RESPONSES	99	83	100	98	100	98	96	75	749

The majority of families dehulled less than 10 kg of grain (Table 6.13). The quantity of grain dehulled was influenced more by the number of people eating together, rather than by region or ethnic origin; neither of which plays a role.

The majority of women spent less than one hour dehulling grain (Table 6.14). The time taken depended primarily on the quantity of grain dehulled. The operation, although tedious, was carried out by hand. Only 3.5% of the families paid to have dehulling done by another person (Table 6.15)

Generally, grinding was more time-consuming than dehulling (Tables 6.16 and 6.17). The time spent on grinding was dependent on the quantity of grain ground and the fineness to which it was ground. Some regions have a definite preference for grits, thus the grinding time would be less. It is interesting to note that Dagana and Khombole and to a lesser extent Louga, had a certain number of mills in operation.

If we can use this data to reflect the national situation, it would be necessary to re-educate the housewives to prepare traditional dishes from dry milled grain, if we wish to introduce new processing methods. At the moment, the grain is dehulled manually and then ground either by machine or by hand. Traditional dehulling implies a wet process, thus a certain fermentation is in motion. This necessitates a daily preparation since mold infestation becomes present after a day or two. The dry process would not require a daily delivery but perhaps weekly or twice monthly depending on the distance between the home and the mill.

Because grinding is a more tedious process than dehulling, more families are willing to pay for grinding (Table 6.18).

The question on milling fractions (Table 6.19 and 6.20) was answered by the enumerator. The results in many cases were guesses since not all samples were weighed. Several methods were used to arrive at these results.

Some of the enumerators were in regions where a trader would loan them scales to weight out each fraction from each family. Others were able to obtain scales away from the village but within the region. The samples thus weighed would experience a loss in moisture content. Some samples were done at a laboratory at CNRA. Still others were complete guesses. They were instructed to express their results in grams when weighing the sample or as a fraction when guessing. All necessary conversions were made during coding.

TABLE 6.13.

QUANTITY OF GRAIN DEHULLED

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR C	SEDH ICU	SINT HIOU	TOTAL
1	2 kg	9	3	11	3	12	2	9	9	58
		15.5	5.2	19.0	5.2	20.7	3.4	15.5	15.5	100.0
		9.3	3.6	11.0	3.0	12.1	2.0	9.4	11.8	7.8
2	3 - 5 kg	33	50	57	74	61	43	46	41	405
		8.1	12.3	14.1	18.3	15.1	10.6	11.4	10.1	100.0
		34.0	60.2	57.0	74.7	61.6	43.9	47.9	53.9	54.1
3	5 - 10 kg	37	28	26	19	25	45	29	18	227
		16.3	12.3	11.5	8.4	11.0	19.8	12.8	7.9	100.0
		38.1	33.7	26.0	19.2	25.3	45.9	30.2	23.7	30.3
4	More than 10 kg	18	2	6	3	1	8	12	8	58
		31.0	3.4	10.3	5.2	1.7	13.8	20.7	13.8	100.0
		18.6	2.4	6.0	3.0	1.0	8.2	12.5	10.5	7.8
	RESPONSES	97	83	100	99	99	98	96	76	748

TABLE 6.14

TIME TAKEN FOR DEHULLING

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRG	SEDHIOU	SINTHIOU	TOTAL
1	< 15 min.	10	3	3	4	15	5	5	7	52
		19.2	5.8	5.8	7.7	28.8	9.6	9.6	13.5	100.0
		10.3	3.6	3.0	4.0	15.3	5.1	5.2	8.9	6.9
2	15 - 30 min.	25	5	34	58	31	25	29	41	248
		10.1	2.0	13.7	23.4	12.5	10.1	11.7	16.5	100.0
		25.8	6.0	34.0	58.6	31.6	25.5	30.2	51.9	33.1
3	30 - 60 min.	26	50	41	31	35	55	25	22	285
		9.1	17.5	14.4	10.9	12.3	19.3	8.8	7.7	100.0
		26.8	60.2	41.0	31.3	35.7	56.1	26.0	27.8	38.0
4	> 60 min.	36	25	22	6	17	13	37	9	165
		21.8	15.2	13.3	3.6	10.3	7.9	22.4	5.5	100.0
		37.1	30.1	22.0	6.1	17.3	13.3	38.5	11.4	22.0
	RESPONSES	97	83	100	99	98	98	96	79	750

TABLE 6.15.

AMOUNT OF MONEY SPENT YESTERDAY ON DEHULLING

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR G	SECH IGU	SINT HIOU	TOTAL
1	NOTHING	85	84	98	98	98	91	94	96	744
		11.4	11.3	13.2	13.2	13.2	12.2	12.6	12.9	100.0
		86.7	100.0	98.0	99.0	98.0	94.8	100.0	99.0	96.9
2	<50	1	0	2	1	1	2	0	0	7
		14.3	0.0	28.6	14.3	14.3	28.6	0.0	0.0	100.0
		1.0	0.0	2.0	1.0	1.0	2.1	0.0	0.0	0.9
3	51 - 100	8	0	0	0	1	2	0	1	12
		66.7	0.0	0.0	0.0	8.3	16.7	0.0	8.3	100.0
		8.2	0.0	0.0	0.0	1.0	2.1	0.0	1.0	1.6
4	101 - 200	4	0	0	0	0	1	0	0	5
		80.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	100.0
		4.1	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.7
	RESPONSES	98	84	100	99	100	96	94	97	768

TABLE 6.16

TIME USED FOR GRINDING YESTERDAY

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH IGU	SINT HIOU	TOTAL
1	∠15 min.	31	1	41	3	3	9	6	5	99
		31.3	1.0	41.4	3.0	3.0	9.1	6.1	5.1	100.0
		33.0	1.4	41.0	3.0	3.1	9.2	7.9	5.6	13.7
2	15 – 30 min.	22	4	4	7	16	7	22	19	101
		21.8	4.0	4.0	6.9	15.8	6.9	21.8	18.8	100.0
		23.4	5.8	4.0	7.1	16.5	7.1	28.9	21.3	14.0
3	30 – 60 "	26	25	24	47	37	28	23	44	254
		10.2	9.8	9.4	18.5	14.6	11.0	9.1	17.3	100.0
		27.7	36.2	24.0	47.5	38.1	28.6	30.3	49.4	35.2
4	>60	15	39	31	42	41	54	25	21	268
		5.6	14.6	11.6	15.7	15.3	20.1	9.3	7.8	100.0
		16.0	56.5	31.0	42.4	42.3	55.1	32.9	23.6	37.1
	RESPONSES	94	69	100	99	97	98	76	89	722

TABLE 6.17

TIME TAKEN FOR DEHULLING AND GRINDING

	GRINDING			
DEHULLING	15 min.	15-30 min.	30-60 min.	>60 min.
15 min	14	25	7	1
15-30 min.	37	46	117	28
30-60 min.	24	10	90	118
60 min.	14	9	18	100

TABLE 6.18.

MONEY SPENT TO GRIND FLOUR YESTERDAY

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR G	SEDH IOU	SINT HIOU	TOTAL
1	NONE	51	68	57	95	96	87	83	97	634
		8.0	10.7	9.0	15.0	15.1	13.7	13.1	15.3	100.0
		54.3	81.0	57.6	96.0	97.0	90.6	100.0	100.0	84.4
2	< 50	17	6	30	3	1	5	0	0	62
		27.4	9.7	48.4	4.8	1.6	8.1	0.0	0.0	100.0
		18.1	7.1	30.3	3.0	1.0	5.2	0.0	0.0	8.3
3	51 - 100	14	9	10	1	2	2	0	0	38
		36.8	23.7	26.3	2.6	5.3	5.3	0.0	0.0	100.0
		14.9	10.7	10.1	1.0	2.0	2.1	0.0	0.0	5.1
4	100 - 200	10	1	2	0	0	2	0	0	15
		66.7	6.7	13.3	0.0	0.0	13.3	0.0	0.0	100.0
		10.6	1.2	2.0	0.0	0.0	2.1	0.0	0.0	2.0
5	> 200	2	0	0	0	0	0	0	0	2
		100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	RESPONSES	94	84	99	99	99	96	83	97	751

TABLE 6.19

MILLING FRACTION

a) HULL

	%	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NICRC	SEDHIOU	SINTHIOU	TOTAL
1	0 -10	0	1	5	0	34	0	0	0	40
		0.0	2.5	12.5	0.0	85.0	0.0	0.0	0.0	100.0
		0.0	1.2	5.0	0.0	34.0	0.0	0.0	0.0	5.4
2	11 - 20	14	54	92	2	50	97	0	0	309
		4.5	17.5	29.8	0.6	16.2	31.4	0.0	0.0	100.0
		14.6	67.5	92.0	2.0	50.0	99.0	0.0	0.0	41.8
3	21 - 30	76	1	2	97	12	1	95	71	355
		21.4	0.3	0.6	27.3	3.4	0.3	26.8	20.0	100.0
		79.2	1.2	2.0	98.0	12.0	1.0	100.0	100.0	48.0
4	31 - 40	6	22	0	0	4	0	0	0	32
		18.8	68.8	0.0	0.0	12.5	0.0	0.0	0.0	100.0
		6.3	27.5	0.0	0.0	4.0	0.0	0.0	0.0	4.3
5	41 - 50	0	2	0	0	0	0	0	0	2
		0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
		0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.3
7	>60	0	0	1	0	0	0	0	0	1
		0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0
		0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.1
	RESPONSES	96	80	100	99	100	98	95	71	739

TABLE 6.19

MILLING FRACTION

b) FLOUR

%	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIOC	SEDHIOU	SINTHIOU	TOTAL
1 0 - 10	0	0	C	0	2	0	0	0	2
	0.0	0.0	0.C	0.0	100.0	0.0	0.0	0.0	100.0
	0.0	0.0	0.C	0.0	2.0	0.0	0.0	0.0	0.3
3 11 - 30	0	0	C	0	0	0	18	2	20
	0.0	0.0	0.C	0.0	0.0	0.0	90.0	10.0	100.0
	0.0	0.0	0.C	0.0	0.0	0.0	34.0	2.1	2.8
4 31 - 40	0	2	C	0	1	18	0	0	21
	0.0	9.5	0.C	0.0	4.8	85.7	0.0	0.0	100.0
	0.0	2.6	0.C	0.0	1.0	18.4	0.0	0.0	2.9
5 41 - 50	28	34	1	94	27	3	35	80	302
	9.3	11.3	0.3	31.1	8.9	1.0	11.6	26.5	100.0
	30.4	43.6	1.0	95.9	27.3	3.1	66.0	83.3	42.3
6 51 - 60	9	8	6	1	17	66	0	0	107
	8.4	7.5	5.6	0.9	15.9	61.7	0.0	0.0	100.0
	9.8	10.3	6.0	1.0	17.2	67.3	0.0	0.0	15.0
7 >60	55	34	93	3	52	11	0	14	262
	21.0	13.0	35.5	1.1	19.8	4.2	0.0	5.3	100.0
	59.8	43.6	93.0	3.1	52.5	11.2	0.0	14.6	36.7
RESPONSES	92	78	100	98	99	98	53	96	714

TABLE 6.19

MILLING FRACTION

c) GRITS

	%	DAGA NA	LOUGA	KHOM BOLE	BAMB EY	FISS EL	NICK C	SEDH IOU	SINT HIOU	TOTAL
1	0 - 10	2	33	88	0	36	10	0	0	169
		1.2	19.5	52.1	0.0	21.3	5.9	0.0	0.0	100.0
		4.2	45.8	88.9	0.0	36.0	10.3	0.0	0.0	24.1
2	11 - 20	16	24	8	1	32	66	0	0	147
		10.9	16.3	5.4	0.7	21.8	44.9	0.0	0.0	100.0
		33.3	33.3	8.1	1.1	32.0	68.0	0.0	0.0	20.9
3	21 - 30	27	2	2	94	14	2	36	83	260
		10.4	0.8	0.8	36.2	5.4	0.8	13.8	31.9	100.0
		56.3	2.8	2.0	98.9	14.0	2.1	38.3	85.6	37.0
4	31 - 40	0	13	0	0	18	19	1	0	51
		0.0	25.5	0.0	0.0	35.3	37.3	2.0	0.0	100.0
		0.0	18.1	0.0	0.0	18.0	19.6	1.1	0.0	7.3
5	41 - 50	0	0	0	0	0	0	16	12	28
		0.0	0.0	0.0	0.0	0.0	0.0	57.1	42.9	100.0
		0.0	0.0	0.0	0.0	0.0	0.0	17.0	12.4	4.0
6	51 - 60	0	0	1	0	0	0	1	0	2
		0.0	0.0	50.0	0.0	0.0	0.0	50.0	0.0	100.0
		0.0	0.0	1.0	0.0	0.0	0.0	1.1	0.0	0.3
7	> 60	3	0	0	0	0	0	40	2	45
		6.7	0.0	0.0	0.0	0.0	0.0	88.9	4.4	100.0
		6.3	0.0	0.0	0.0	0.0	0.0	42.6	2.1	6.4
	RESPONSES	48	72	99	95	100	97	94	97	702

TABLE 6.20

MILLING FRACTIONS

PROPORTION FLOUR	PROPORTION GRITS	DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
0 - 10	0 - 10	0	0	0	0	2	0	0	0	2
21 - 30	21 - 30	0	0	0	0	0	0	1	0	1
21 - 30	31 - 40	0	0	0	0	0	0	1	0	1
21 - 30	41 - 50	0	0	0	0	0	0	16	0	16
31 - 40	31 - 40	0	0	0	0	1	18	0	0	19
41 - 50	11 - 20	1	13	0	0	3	0	0	0	17
41 - 50	21 - 30	26	1	1	92	8	2	34	76	240
41 - 50	31 - 40	0	8	0	0	15	1	0	0	24
51 - 60	11 - 20	9	0	4	1	13	66	0	0	93
51 - 60	21 - 30	0	0	1	0	4	0	0	0	5
>60	0 - 10	2	18	87	0	34	10	0	0	151
>60	11 - 20	5	0	3	0	16	0	0	0	24
>60	21 - 30	0	0	0	0	2	0	0	6	8

The question was answered reasonably well. In tests done on samples brought to Bambey, hull fractions varied between 15 and 35% and this was also true of the results in the field. Fissel was the one exception to this.

On the whole, most of the families preferred at least 40% flour and less than 30% grits. On this basis, we should look at dehulling-grinding equipment that would remove a 20-25% hull fraction with the remainder being flour or grits but the proportion should be oriented towards the people's needs. These different proportions are expressed in Table 6.20. Note that while Table 6.19 regards all answers, Table 6.20 only looks at what may be possible combinations. Setting up Table 6.20 in 2 dimension for each region we found that the survey indicated the following preferences per region:

(1) Dagana: grits 10-30%   flour 40%

(2) Louga: two types:
              grits 10-40%   flour 40-50%
              grits 10%   flour 60% +

(3) Khombole: grits 0-20%   flour 50% +

(4) Bambey: grits 20-30%   flour 40% +

(5) Fissel: grits 10-40%   flour 40% +

(6) Nioro: two types:
              grits 20%   flour 50% +
              grits 20-40%   flour 30-50%

(7) Sédhiou: two types:
              grits 30-40%   flour 40-50%
              grits 30-50%   flour 40-50%

(8) Sinthiou: grits 20-30%   flour 40-50%

Much of this can be explained by the type of food prepared. Where the grit fractions vary, as in the case of Louga, the grits would be used for lakh while the flour would be used for couscous. Those eating fish and rice for lunch would therefore require a higher flour fraction to make their couscous. The Nioro and Sédhiou differences can be explained by looking at whether the people eat couscous, nielang, mafé or some other dish.

CHAPTER 7

NUTRITION

7.1 CHOICE OF GRAINS FOR FOOD

Over 80% of the families chose millet as their first choice of cereal grain used in meal preparation (Table 7.1). Rice was used by some families at Dagana (46.0%), Louga (24.0%), Nioro (15.0%) and Sédhiou (28.0%). The families from Dagana and Sédhiou using rice are probably growing it in their fields. Those families that preferred rice at Louga may represent the families within the region who in March were already buying cereals for food. Since rice is a status food, they would naturally buy rice over millet if it was available and if they could afford it. The situation at Nioro is somewhat more complex since to the authors' knowledge, there were no cereal shortages at the time.

When families were asked about a second choice, rice became more important, probably because it is considered a status food among Senegalese families (Table 7.2). Sorghum was a second choice at Fissel (62.2%) and at Sinthiou (32.0%), while maize was the choice of the farmers at Sinthiou (37.4%). The southern regions appear to be rather heterogeneous in their choices, which may reflect ethnic differences once millet is unavailable.

Groundnuts were the first choice of grain legumes used for food while cowpeas ranked second (Table 7.2). As a second choice cowpeas were important in all regions except Sédhiou and Sinthiou where other types of grain legumes were preferred.

The question on choice of cereals was repeated at all three periods. Millet was dropped slightly (5.4%) between March and July. In January 1977, all regions except Dagana used millet most frequently. In Dagana 94.4% of the families used rice. This is certainly due to the lack of millet following a poor 1976 harvest.

The preference for millet is not as pronounced as its actual use. In fact, in January, only 48.5% preferred millet over other cereals and only 47.1% preferred and used millet.

The use of sorghum as a food should not be overlooked since it was preferred by 7.0% of the population. Although rice ranked ahead of sorghum, it is an imported crop to many of the regions. Sorghum can be grown in much of the central and southern part of Senegal. The sorghum breeding programs for both northern and southern Senegal, that are being carried out at CNRA, should therefore be encouraged, unless rice acreages increase so that rice imports are no longer required.

TABLE 7.1.

CHOICE OF CEREALS USED FOR FOOD

a) FIRST CHOICE

		DAGA NA	LOUGA	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH ICU	SINT HIOU	TOTAL
1	MILLET	51	76	94	97	96	82	63	82	641
		8.0	11.9	14.7	15.1	15.0	12.8	9.8	12.8	100.0
		51.0	76.0	94.0	97.0	96.0	82.0	63.0	82.8	80.2
2	SORGHUM	3	0	C	1	1	1	7	6	19
		15.8	0.0	0.0	5.3	5.3	5.3	36.8	31.6	100.0
		3.0	0.0	0.0	1.0	1.0	1.0	7.0	6.1	2.4
3	MAIZE	0	0	0	0	0	2	2	4	8
		0.0	0.0	0.0	0.0	0.0	25.0	25.0	50.0	100.0
		0.0	0.0	0.0	0.0	0.0	2.0	2.0	4.0	1.0
4	RICE	46	24	6	2	3	15	28	7	131
		35.1	18.3	4.6	1.5	2.3	11.5	21.4	5.3	100.0
		46.0	24.0	6.0	2.0	3.0	15.0	28.0	7.1	16.4
	RESPONSES	100	100	100	100	100	100	100	99	799

TABLE 7.1.

CHOICE OF CEREALS USED FOR FOOD

b) SECOND CHOICE

		DAGA NA	LCUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH IOU	SINT HIOU	TOTAL
1	MILLET	30	19	6	3	3	16	33	3	113
		26.5	16.8	5.3	2.7	2.7	14.2	29.2	2.7	100.0
		31.9	20.2	6.0	3.2	3.1	16.3	34.4	3.0	14.6
2	SORGHUM	17	5	5	16	61	21	12	32	169
		10.1	3.0	3.0	9.5	36.1	12.4	7.1	18.9	100.0
		18.1	5.3	5.0	17.2	62.2	21.4	12.5	32.3	21.9
3	MAIZE	2	0	0	0	0	45	8	37	92
		2.2	0.0	0.0	0.0	0.0	48.9	8.7	40.2	100.0
		2.1	0.0	0.0	0.0	0.0	45.9	8.3	37.4	11.9
4	RICE	45	69	87	74	27	16	41	19	378
		11.9	18.3	23.0	19.6	7.1	4.2	10.8	5.0	100.0
		47.9	73.4	87.0	79.6	27.6	16.3	42.7	19.2	49.0
5	OTHER	0	1	2	0	7	0	2	8	20
		0.0	5.0	10.0	0.0	35.0	0.0	10.0	40.0	100.0
		0.0	1.1	2.0	0.0	7.1	0.0	2.1	8.1	2.6
	RESPONSES	94	94	100	93	98	98	96	99	772

TABLE 7.2.

CHOICE OF GRAIN LEGUMES FOR FOOD

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NICR C	SEDH ICU	SINT HIOU	TOTAL
1	GROUNDNUTS	55	77	87	99	98	99	75	99	689
		8.0	11.2	12.6	14.4	14.2	14.4	10.9	14.4	100.0
		55.0	78.6	87.0	99.0	98.0	99.0	75.0	100.0	86.4
2	COWPEA	22	21	13	1	0	1	0	0	58
		37.9	36.2	22.4	1.7	0.0	1.7	0.0	0.0	100.0
		22.0	21.4	13.0	1.0	0.0	1.0	0.0	0.0	7.3
3	OTHER	23	0	0	0	2	0	25	0	50
		46.0	0.0	0.0	0.0	4.0	0.0	50.0	0.0	100.0
		23.0	0.0	0.0	0.0	2.0	0.0	25.0	0.0	6.3
	RESPONSES	100	98	100	100	100	100	100	99	797

7.2 MEALS

The traditional dishes of Senegal vary according to region. On a national basis, everyone eats fish and rice which is prepared with different vegetables. The fish and rice is generally eaten at lunch.

In many of the rural areas, fish, dried or fresh, is not available. Often the families cannot afford to buy rice. For these families, a millet grit, which is steamed, is mixed with milk, usually sour, and eaten. This is known as lakh. For those living in southern Senegal, a groundnut stew, called mafe, is often prepared for lunch. Nielang and lakhou bissap are other lunch dishes that are generally prepared from millet. The different millet dishes are often prepared with maize or sorghum if millet is not available. Dakhine and mbakhalou saloum are rice dishes found in the South.

Probably through its islamic ties, couscous is the favorite evening meal. Although the traditional Moroccan couscous is made of wheat, couscous in Senegal is generally made from millet and sometimes from sorghum or maize. This couscous dish is generally served with meat and vegetables. This couscous provides a fairly balanced diet. There are problems however. In certain cases, there is little or no meat and few if any vegetables. Traditionally, the adult males of the family eat first. Often the wives and children only have the millet grain to eat. The definition of what a couscous is can therefore be very broad.

The survey results confirmed what knowledge of eating habits was gained previously (Tables 7.3 to 7.6). Surprisingly enough, there were few changes in meal patterns between March and July. The authors found the picture less clear cut in July indicating that when the preferred cereal is lacking, other meals are prepared. The variability could also be due to the fact that the wife is more occupied in July and has less time for food preparation. She would therefore prepare foods which take less preparation time.

7.3 FOODS OTHER THAN CEREALS AND GRAIN LEGUMES

The majority of rural people eat meat less than once a week (Table 7.7). In general, the people in the north eat meat less frequently than those further south. There were no shortages of meat in the diets of the people of Casamance.

TABLE 7.3.

LUNCH PERIOD 1

REGIONS

DISHES	1	2	3	4	5	6	7	8	TOTAL
LAKH	21	61	37	76	58	0	0	6	261
COUSCOUS	0	0	1	0	2	0	6	1	10
FISH AND RICE	77	20	34	21	22	12	0	0	186
DAKHINE	0	0	1	0	1	0	0	0	2
MAFE	1	3	0	0	0	19	4	47	74
NIELANG	0	0	1	0	2	55	55	25	138
LAKHOU BISSAP	0	0	15	1	1	2	0	0	19
MBAKHALOU SALOUM	0	0	1	0	1	7	0	0	9
OTHER	1	15	9	0	11	5	34	17	92
TOTAL	100	99	99	100	98	100	99	96	791

TABLE 7.4.

LUNCH PERIOD 2

DISHES	REGIONS								
	1	2	3	4	5	6	7	8	TOTAL
LAKH	6	29	36	66	63	0	0	2	202
COUSCOUS	0	0	0	0	0	0	22	1	23
FISH AND RICE	83	11	35	26	28	13	0	1	197
DAKHINE	0	0	11	3	0	0	0	0	14
MAFE	1	1	0	0	0	17	10	31	60
NIELANG	0	0	0	0	0	55	26	36	117
LAKHOU BISSAP	0	1	8	2	1	0	0	0	12
BAKHALOU SALOUM	0	0	0	0	1	1	0	0	2
OTHERS	1	4	6	1	6	11	41	18	88
TOTAL	91	46	96	98	99	97	99	89	715

TABLE 7.5.

DINNER PERIOD 1

REGIONS

DISHES	1	2	3	4	5	6	7	8	TOTAL
LAKH	1	0	2	1	0	0	0	0	4
COUSCOUS	80	72	95	98	96	94	4	90	629
FISH AND RICE	16	9	1	1	4	0	0	1	32
DAKHINE	0	2	0	0	0	0	0	0	2
MAFE	0	1	0	0	0	0	15	4	20
NIELANG	0	0	1	0	0	1	38	0	40
LAKHOU BISSAP	0	0	0	0	0	0	0	0	0
BAKHALOU SALOUM	0	2	0	0	0	0	0	0	2
OTHERS	3	14	1	0	0	5	42	1	66
TOTAL	100	100	100	100	100	100	99	96	795

TABLE 7.6.

DINNER PERIOD 2

REGIONS

DISHES	1	2	3	4	5	6	7	8	TOTAL
LAKH	0	0	0	0	0	0	1	0	1
COUSCOUS	69	36	77	92	96	67	19	85	541
FISH AND RICE	21	9	6	5	1	0	0	0	42
DAKHINE	0	0	10	0	0	0	0	0	10
MAFE	0	0	1	0	0	0	13	2	16
NIELANG	0	0	0	0	0	0	21	0	21
LAKHOU BISSAP	0	0	2	0	0	0	0	1	3
BAKHALOU SALOUM	0	1	0	0	0	8	0	0	9
OTHERS	1	2	1	1	0	22	45	1	73
TOTAL	91	48	97	98	97	97	99	89	716

TABLE 7.7

USE OF MEAT IN DIET

TIMES USED PER WEEK	DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1 NEVER	3	4	6	11	27	23	0	8	82
	3.7	4.9	7.3	13.4	32.9	28.0	0.0	9.8	100.0
	3.3	8.5	6.1	11.3	27.3	25.0	0.0	8.6	11.4
2 < 1	72	35	62	54	59	46	1	40	369
	19.5	9.5	16.8	14.6	16.0	12.5	0.3	10.8	100.0
	80.0	74.5	62.6	55.7	59.6	50.0	1.0	43.0	51.5
3 2	10	4	25	18	10	8	17	13	105
	9.5	3.8	23.8	17.1	9.5	7.6	16.2	12.4	100.0
	11.1	8.5	25.3	18.6	10.1	8.7	17.0	14.0	14.6
4 3	2	1	3	12	2	6	7	4	37
	5.4	2.7	8.1	32.4	5.4	16.2	18.9	10.8	100.0
	2.2	2.1	3.0	12.4	2.0	6.5	7.0	4.3	5.2
5 > 3	3	1	3	0	1	3	10	18	39
	7.7	2.6	7.7	0.0	2.6	7.7	25.6	46.2	100.0
	3.3	2.1	3.0	0.0	1.0	3.3	10.0	19.4	5.4
6	0	2	0	2	0	6	65	10	85
	0.0	2.4	0.0	2.4	0.0	7.1	76.5	11.8	100.0
	0.0	4.3	0.0	2.1	0.0	6.5	65.0	10.8	11.9
RESPONSES	90	47	99	97	99	92	100	93	717

Since fish is one of the favorite lunch dishes, most of the regions appeared to have eaten fish more than three times a week (Table 7.8). There was no distinction made between dried or fresh fish; it was more important to learn if it was being eaten, where, and how often. As expected, the families from Bambey, Fissel and Sédhiou eat less fish than the other regions. Although Khombole is near Bambey, the villages chosen appeared to have access to fish. This may be due to the large markets at Touba Toul or Thies which are both less than 30 km from any of the villages.

Milk, being one of the ingredients to several dishes, was consumed by 40% of the families more than three times a week (Table 7.9). Families at Fissel, Khombole and Sinthiou use milk less frequently than those in other regions. Village differences show up at Dagana and Sinthiou. At least one village has a reliable milk source.

Eggs are eaten rarely by most Senegalese families. Custom dictates that a child who eats eggs tends to learn to speak at a later date (Table 7.10). As such, 92.3% of the families eat eggs less than once a week. Where nutrition education has conquered this custom, eggs are being consumed. This is evident at Sédhiou as a result of various government adult training courses.

Vegetables are consumed less than once a week by 45.5% of the families (Table 7.11). Nevertheless, vegetables were eaten in all regions except Sinthiou. Many of these would have been shipped in from larger centres and transportation to the villages chosen in the Sinthiou region was extremely difficult. For this reason, Sinthiou may appear badly in the results in this section.

Apart from Sédhiou, very few people eat fruit more than three times a week (Table 7.12). While the figure for Sédhiou is 79%, for the rest of the country it is around 5%.

Pulses, nuts, seeds and leaves were used often (Table 7.13). The dried baobab leaf is used to make couscous more "slippery" so that it does not irritate the throat when being eaten. This irritation increases as the amount of hull not removed increases. The 45.5% of families of Khombole using this food source less than once a week is surprising since climatic and sociological differences are not present between Khombole and Bambey.

The majority of families use sweetening agents such as sugar and honey quite regularly (Table 7.14). Village differences in either availability or choice were reflected at Khombole, Fissel, Nioro and Sinthiou.

TABLE 7.8.

USE OF FISH IN DIET

TIMES USED PER WEEK

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	NEVER	39	1	0	2	0	1	0	10	53
		73.6	1.9	0.0	3.8	0.0	1.9	0.0	18.9	100.0
		43.3	2.1	0.0	2.1	0.0	1.1	0.0	10.8	7.4
2	<1	5	2	11	13	33	2	2	34	102
		4.9	2.0	10.8	12.7	32.4	2.0	2.0	33.3	100.0
		5.6	4.3	11.1	13.4	33.3	2.2	2.0	36.6	14.2
3	1	0	6	11	40	10	2	3	6	78
		0.0	7.7	14.1	51.3	12.8	2.6	3.8	7.7	100.0
		0.0	12.8	11.1	41.2	10.1	2.2	3.0	6.5	10.9
4	2	0	7	0	19	16	3	15	0	60
		0.0	11.7	0.0	31.7	26.7	5.0	25.0	0.0	100.0
		0.0	14.9	0.0	19.6	16.2	3.3	15.0	0.0	8.4
5	3	0	2	3	11	9	5	6	0	36
		0.0	5.6	8.3	30.6	25.0	13.9	16.7	0.0	100.0
		0.0	4.3	3.0	11.3	9.1	5.4	6.0	0.0	5.0
6	>3	46	29	74	12	31	79	74	43	388
		11.9	7.5	19.1	3.1	8.0	20.4	19.1	11.1	100.0
		51.1	61.7	74.7	12.4	31.3	85.9	74.0	46.2	54.1
	RESPONSES	90	47	99	97	99	92	100	93	717

TABLE 7. 9.

USE OF MILK IN DIET

TIMES USED PER WEEK

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	NEVER	4	1	19	0	30	9	2	13	78
		5.1	1.3	24.4	0.0	38.5	11.5	2.6	16.7	100.0
		4.4	2.1	19.2	0.0	30.3	9.8	2.0	14.0	10.9
2	<1	26	8	36	3	27	16	2	42	160
		16.2	5.0	22.5	1.9	16.9	10.0	1.2	26.2	100.0
		28.9	17.0	36.4	3.1	27.3	17.4	2.0	45.2	22.3
3	1	13	4	0	3	9	13	9	3	54
		24.1	7.4	0.0	5.6	16.7	24.1	16.7	5.6	100.0
		14.4	8.5	0.0	3.1	9.1	14.1	9.0	3.2	7.5
4	2	8	4	6	21	9	14	23	0	85
		9.4	4.7	7.1	24.7	10.6	16.5	27.1	0.0	100.0
		8.9	8.5	6.1	21.6	9.1	15.2	23.0	0.0	11.9
5	3	0	2	0	21	9	5	16	0	53
		0.0	3.8	0.0	39.6	17.0	9.4	30.2	0.0	100.0
		0.0	4.3	0.0	21.6	9.1	5.4	16.0	0.0	7.4
6	>3	39	28	38	49	15	35	48	35	287
		13.6	9.8	13.2	17.1	5.2	12.2	16.7	12.2	100.0
		43.3	59.6	38.4	50.5	15.2	38.0	48.0	37.6	40.0
	RESPONSES	90	47	99	97	99	92	100	93	717

TABLE 7.10.

USE OF EGG IN DIET

TIMES USED PER WEEK

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	NEVER	5	11	63	71	60	88	66	66	430
		1.2	2.6	14.7	16.5	14.0	20.5	15.3	15.3	100.0
		5.6	23.4	63.6	73.2	60.6	95.7	66.7	71.0	60.1
2	<1	69	31	34	23	38	2	9	24	230
		30.0	13.5	14.8	10.0	16.5	0.9	3.9	10.4	100.0
		77.5	66.0	34.3	23.7	38.4	2.2	9.1	25.8	32.2
3	1	13	3	1	2	1	2	6	1	29
		44.8	10.3	3.4	6.9	3.4	6.9	20.7	3.4	100.0
		14.6	6.4	1.0	2.1	1.0	2.2	6.1	1.1	4.1
4	2	0	0	0	1	0	0	10	0	11
		0.0	0.0	0.0	9.1	0.0	0.0	90.9	0.0	100.0
		0.0	0.0	0.0	1.0	0.0	0.0	10.1	0.0	1.5
5	3	0	0	0	0	0	0	7	0	7
		0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0
		0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	1.0
6	>3	2	2	1	0	0	0	1	2	8
		25.0	25.0	12.5	0.0	0.0	0.0	12.5	25.0	100.0
		2.2	4.3	1.0	0.0	0.0	0.0	1.0	2.2	1.1
	RESPONSES	89	47	99	97	99	92	99	93	715

TABLE 7.11.

USE OF VEGETABLE IN DIET

TIMES USED PER WEEK

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH TOU	SINT HIOU	TOTAL
1	NEVER	12	2	1	1	2	22	0	21	61
		19.7	3.3	1.6	1.6	3.3	36.1	0.0	34.4	100.0
		13.5	4.3	1.0	1.0	2.0	23.9	0.0	22.6	8.5
2	< 1	15	5	56	25	66	28	1	69	265
		5.7	1.9	21.1	9.4	24.9	10.6	0.4	26.0	100.0
		16.9	10.6	56.6	25.8	66.7	30.4	1.0	74.2	37.0
3	1	9	23	10	35	16	6	6	2	107
		8.4	21.5	9.3	32.7	15.0	5.6	5.6	1.9	100.0
		10.1	48.9	10.1	36.1	16.2	6.5	6.0	2.2	14.9
4	2	1	4	0	18	2	17	19	0	61
		1.6	6.6	0.0	29.5	3.3	27.9	31.1	0.0	100.0
		1.1	8.5	0.0	18.6	2.0	18.5	19.0	0.0	8.5
5	3	1	3	4	16	3	4	11	0	42
		2.4	7.1	9.5	38.1	7.1	9.5	26.2	0.0	100.0
		1.1	6.4	4.0	16.5	3.0	4.3	11.0	0.0	5.9
6	> 3	51	10	28	2	10	15	63	1	180
		28.3	5.6	15.6	1.1	5.6	8.3	35.0	0.6	100.0
		57.3	21.3	28.3	2.1	10.1	16.3	63.0	1.1	25.1
	RESPONSES	89	47	99	97	99	92	100	93	716

TABLE 7.12

USE OF FRUIT IN DIET

TIMES USED PER WEEK		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	NEVER	19	3	6	2	39	13	0	11	93
		20.4	3.2	6.5	2.2	41.9	14.0	0.0	11.8	100.0
		21.6	6.4	6.1	2.1	39.4	14.1	0.0	11.8	13.0
2	<1	64	13	73	73	55	50	0	65	393
		16.3	3.3	18.6	18.6	14.0	12.7	0.0	16.5	100.0
		72.7	27.7	73.7	75.3	55.6	54.3	0.0	69.9	55.0
3	1	3	17	12	11	1	2	4	7	57
		5.3	29.8	21.1	19.3	1.8	3.5	7.0	12.3	100.0
		3.4	36.2	12.1	11.3	1.0	2.2	4.0	7.5	8.0
4	2	1	2	5	6	0	5	3	0	22
		4.5	9.1	22.7	27.3	0.0	22.7	13.6	0.0	100.0
		1.1	4.3	5.1	6.2	0.0	5.4	3.0	0.0	3.1
5	3	0	4	2	3	2	6	14	0	31
		0.0	12.9	6.5	9.7	6.5	19.4	45.2	0.0	100.0
		0.0	8.5	2.0	3.1	2.0	6.5	14.0	0.0	4.3
6	>3	1	8	1	2	2	16	79	10	119
		0.8	6.7	0.8	1.7	1.7	13.4	66.4	8.4	100.0
		1.1	17.0	1.0	2.1	2.0	17.4	79.0	10.8	16.6
	RESPONSES	88	47	99	97	99	92	100	93	715

TABLE 7.13.

USE OF PULSES, NUTS AND SEEDS IN DIET

TIMES USED PER WEEK

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	never	3	3	1	5	0	0	0	0	12
		25.0	25.0	8.3	41.7	0.0	0.0	0.0	0.0	100.0
		3.4	6.4	1.0	5.2	0.0	0.0	0.0	0.0	1.7
2	<1	18	15	45	0	15	0	8	55	156
		11.5	9.6	28.8	0.0	9.6	0.0	5.1	35.3	100.0
		20.2	31.9	45.5	0.0	15.2	0.0	8.0	59.1	21.8
3	1	14	2	6	0	16	0	11	2	51
		27.5	3.9	11.8	0.0	31.4	0.0	21.6	3.9	100.0
		15.7	4.3	6.1	0.0	16.2	0.0	11.0	2.2	7.1
4	2	4	4	2	1	6	1	3	3	24
		16.7	16.7	8.3	4.2	25.0	4.2	12.5	12.5	100.0
		4.5	8.5	2.0	1.0	6.1	1.1	3.0	3.2	3.4
5	3	1	2	7	20	6	2	7	0	45
		2.2	4.4	15.6	44.4	13.3	4.4	15.6	0.0	100.0
		1.1	4.3	7.1	20.6	6.1	2.2	7.0	0.0	6.3
6	>3	49	21	38	71	56	89	71	33	428
		11.4	4.9	8.9	16.6	13.1	20.8	16.6	7.7	100.0
		55.1	44.7	38.4	73.2	56.6	96.7	71.0	35.5	59.8
	RESPONSES	89	47	99	97	99	92	100	93	716

TABLE 7.14

USE OF HONEY OR SUGAR IN DIET

TIMES USED PER WEEK

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	NEVER	0	1	7	0	1	3	2	2	16
		0.0	6.3	43.8	0.0	6.3	18.8	12.5	12.5	100.0
		0.0	2.1	7.1	0.0	1.0	3.3	2.0	2.2	2.2
2	<1	0	0	29	1	17	35	2	17	101
		0.0	0.0	28.7	1.0	16.8	34.7	2.0	16.8	100.0
		0.0	0.0	29.3	1.0	17.2	38.0	2.0	18.3	14.1
3	1	0	0	3	5	21	13	6	12	60
		0.0	0.0	5.0	8.3	35.0	21.7	10.0	20.0	100.0
		0.0	0.0	3.0	5.2	21.2	14.1	6.0	12.9	8.4
4	2	0	0	0	3	15	2	18	0	38
		0.0	0.0	0.0	7.9	39.5	5.3	47.4	0.0	100.0
		0.0	0.0	0.0	3.1	15.2	2.2	18.0	0.0	5.3
5	3	0	0	0	11	9	2	25	0	47
		0.0	0.0	0.0	23.4	19.1	4.3	53.2	0.0	100.0
		0.0	0.0	0.0	11.3	9.1	2.2	25.0	0.0	6.6
6	>3	89	46	60	77	36	37	47	62	454
		19.6	10.1	13.2	17.0	7.9	8.1	10.4	13.7	100.0
		100.0	97.9	60.6	79.4	36.4	40.2	47.0	66.7	63.4
	RESPONSES	89	47	99	97	99	92	100	93	716

The authors used questions 1 to 7 in Appendix II and allowed weights of 0, 0, 1, 2, 3 and 4 for the six choices. These were then added up to find out what the total intakes were weekly from animal origin as well as plant origin other than cereals and grain legumes. The results were used to produce Tables 7.15 and 7.16. Table 7.15 illustrates the national picture and shows that 41.1% of the families had eaten foods of animal origin at least seven times per week while the percentage of families having eaten foods of plant origin is only 14%. The true picture is rather masked because of Sédhiou. Table 7.16 indicates a large difference between the eating pattern at Sédhiou and the rest of the country. Coupled with the fact that different family members may not all get equal portions, it indicates that there are many people claiming to have eaten couscous when they have eaten only millet. The concern of CNRA and the Government of Senegal to improve millet protein content and quality is very justified.

Table 7.17 is a synthesis of food items bought by the different households. The people at Sinthiou seem to either lack goods or the money to purchase them since they are generally lower in purchases than other regions. In terms of developing improved post-harvest systems for the country, two things from the chart are evident. The amount of imported goods sold can be high even in rural areas. This is quite natural. However, the disheartening fact is that wheat flour, pasta and potatoes were used and yet could be exchanged by locally grown foods.

The work carried out by ITA at Dakar on millet bread and couscous could have a tremendous impact on rural life. By the introduction of millet bread into the rural areas, the amount of wheat flour which needs to be imported could be reduced. Furthermore, millet bread does not harden as quickly as bread made from wheat flour.

The use of pasta and potatoes occurred to reduce preparation time of meals. The making of a cheap couscous manufactured within the country could probably replace much of these purchases. The Government view on continued research on millet bread and industrially made couscous should therefore be encouraged.

TABLE 7.15.

FOOD SOURCES OTHER THAN CEREALS

VEGETABLE

ANIMAL	0	1	2	3	4	5	6	7	TOTAL	% OF TOTAL
0	54 7,5 *	6 0,8	0 0,0	1 0,1	1 0,1	0 0,0	0 0,0	0 0,0	62	8,6
1	23 3,2	11 1,5	4 0,6	0 0,0	2 0,3	0 0,0	0 0,0	0 0,0	40	5,6
2	16 2,2	9 1,3	1 0,1	2 0,3	0 0,0	0 0,0	2 0,3	1 0,1	31	4,3
3	21 2,9	3 0,4	4 0,6	4 0,6	3 0,4	0 0,0	0 0,0	0 0,0	35	4,9
4	75 0,5	27 3,8	4 0,6	3 0,4	34 4,7	2 0,3	1 0,1	8 1,1	154	21,5
5	16 2,2	8 1,1	8 1,1	2 0,3	7 1,0	1 0,1	0 0,0	6 0,8	48	6,7
6	27 3,8	3 0,4	6 0,8	3 0,4	7 1,0	0 0,0	0 0,0	6 0,8	52	7,3
7	66 9,2	16 2,2	28 3,9	13 1,8	48 6,7	23 3,2	21 2,9	80 11,2	295	41,1
TOTAL	298 41,6	83 11,6	55 7,7	28 3,9	102 14,2	26 3,6	24 3,3	101 14,1	717	

* % of total

TABLE 7.16

SOURCE OF FOODS OTHER THAN CEREALS

TIMES PER WEEK	VEGETABLE			ANIMAL		
	NATIONAL	SEDHIOU	OTHERS	NATIONAL	SEDHIOU	OTHERS
0	298 (41,6)	0 (0)	298 (48,3)	62 (8,6)	0 (0)	62 (10,0)
1	83 (11,6)	0 (0)	83 (13,5)	40 (5,6)	0 (0)	40 (6,5)
2	55 (7,7)	0 (0)	55 (8,9)	31 (4,3)	1 (1,0)	30 (4,9)
3	28 (3,9)	3 (3,0)	25 (4,1)	35 (4,9)	0 (0,0)	35 (5,7)
4	102 (14,2)	3 (3,0)	99 (16,0)	154 (21,5)	3 (3,0)	151 (24,5)
5	26 (3,6)	14 (14,0)	12 (1,9)	48 (6,7)	3 (3,0)	45 (7,3)
6	24 (3,3)	10 (10,0)	14 (2,3)	52 (7,3)	6 (6,0)	46 (7,5)
7 or more	101 (14,1)	70 (70,0)	31 (5,0)	295 (41,1)	87 (87,0)	208 (33,7)
TOTAL	717	100	617	717	100	617

% of total in parentheses

TABLE 7.17.

PURCHASE OF FOODSTUFFS, MARCH 1976

	D	L	KH.	B	F	N	SED.	SIN.	TOTAL	% OF TOT.
BREAD	78	95	53	84	64	64	88	43	569	71.3
SUGAR	100	100	100	100	94	87	92	67	740	92.7
TEA	97	96	46	60	30	12	23	14	378	47.5
COFFEE	46	92	48	61	23	26	31	19	346	43.5
POWDERED MILK	15	23	18	9	7	4	6	0	82	10.3
LIQUID MILK	60	46	45	42	14	20	52	8	287	36.1
TOMATO PASTE	92	87	75	89	76	82	88	21	610	76.5
WHEAT FLOUR	58	35	28	84	32	15	6	19	277	34.8
MAIZE GRITS	39	38	32	25	30	23	20	54	261	32.8
BISCUITS	77	89	85	93	94	77	81	30	626	78.5
VINEGAR	97	92	61	98	55	37	51	19	510	64.1
PEPPER	97	95	66	98	67	90	57	25	595	74.7
SALT	98	99	99	99	99	98	73	92	757	94.9
POTATOES	74	82	55	99	67	48	46	20	491	61.7
PASTA	72	53	38	97	56	37	28	15	396	49.8

7.4 INFANT FEEDING

The majority of families in all regions except Sédhiou fed their unweaned children the same food as that eaten by other family members (Table 7.18). At Sédhiou, 88% of the families prepared a special meal for the unweaned child. This represents 50.9% of the national figure. For the other regions, the percentage of families providing specially home prepared baby food before weaning varied between 1.7 and 16.2%. It was encouraging to note that only 3.3% of the families purchased food for the child since commercially prepared foods tend to be extremely expensive.

The general feeling of most mothers was that breast milk was adequate to meet the dietary requirements of the child. At Bambey and Khombole this was found to be especially true since the child did not have any specially prepared food until after weaning. Interestingly enough (Table 7.19), the families at Sédhiou did not prepare a special meal for the child after weaning. If one looks at the dietary pattern of the region, it would probably be found that the adult diet was adequate. This is not true of the other regions within the country.

The need for an inexpensive, locally-produced baby food that supplies the required nutrients at the right level is obviously a necessity.

TABLE 7.18

INFANT FOODS BEFORE WEANING

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	SAME AS ADULT	81	29	96	75	76	78	12	65	512
		15.8	5.7	18.8	14.6	14.8	15.2	2.3	12.7	100.0
		90.0	61.7	97.0	77.3	76.8	84.8	12.0	69.9	71.4
2	HOME PREPARED FOR CHILD	8	10	3	13	13	10	88	28	173
		4.6	5.8	1.7	7.5	7.5	5.8	50.9	16.2	100.0
		8.9	21.3	3.0	13.4	13.1	10.9	88.0	30.1	24.1
3	PURCHASED FOR CHILD	1	8	0	1	10	4	0	0	24
		4.2	33.3	0.0	4.2	41.7	16.7	0.0	0.0	100.0
		1.1	17.0	0.0	1.0	10.1	4.3	0.0	0.0	3.3
4	OTHER	0	0	0	8	0	0	0	0	8
		0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
		0.0	0.0	0.0	8.2	0.0	0.0	0.0	0.0	1.1
	RESPONSES	90	47	99	97	99	92	100	93	717

TABLE 7.19

INFANT FOODS AFTER WEANING

	DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1 SAME AS ADULT	89	37	63	39	99	72	99	84	582
	15.3	6.4	10.8	6.7	17.0	12.4	17.0	14.4	100.0
	98.9	78.7	63.6	40.2	100.0	78.3	99.0	90.3	81.2
2 HOME PREPARED FOR CHILD	1	4	36	50	0	16	1	9	117
	0.9	3.4	30.8	42.7	0.0	13.7	0.9	7.7	100.0
	1.1	8.5	36.4	51.5	0.0	17.4	1.0	9.7	16.3
3 PURCHASED FOR CHILD	0	6	0	2	0	4	0	0	12
	0.0	50.0	0.0	16.7	0.0	33.3	0.0	0.0	100.0
	0.0	12.8	0.0	2.1	0.0	4.3	0.0	0.0	1.7
4 OTHER	0	0	0	6	0	0	0	0	6
	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0
	0.0	0.0	0.0	6.2	0.0	0.0	0.0	0.0	0.8
RESPONSES	90	47	99	97	99	92	100	93	717

C H A P T E R   8

FUNCTIONAL PROPERTIES

8.1   INTRODUCTION

The discussion which follows was taken from open ended questions which were of the type "what qualities do you think a good sorghum (millet, maize, rice) should have?" Since this document is concerned only with post-harvest technology, all characteristics which are agronomic will be grouped and not discussed. The need for this information on functional properties is evident in all breeding programs.

The agronomic characteristics always mentioned the importance of a sound healthy plant with a large panicle. To most of the families, a high yielding variety is always one that has tall, sound, healthy plants (Tables 8.1 to 8.4).

8.2   DESIRABLE GRAIN CHARACTERISTICS

The sorghum preferred by most Senegalese families should be a large, white kernel. The desirability of a white hull allows one to remove less when dehulling. The size of a kernel determines what percentage of a kernel is available for eating. Assume that the thickness of hull is 1 unit. If the radius of the kernel is 2 units, complete removal of the hull would only yield 12.5% flour and grits. This gets progressively better as the radius increases. For example, on a 15 unit radius, the flour and grits would be 81.3%. Since the Senegalese families can detect hull fractions not removed, this desire for large grain has probably been acquired by experience. That is, the larger the kernel, the greater the percentage of flour and grits.

The desire for a large kernel of millet and maize was also expressed. For both millet and sorghum there was some concern at Bambey that the grain be dry. This probably is related to storage or processing problems.

The families appeared to be more critical of the rice they ate since the rice was purchased. At Sédhiou, the families growing rice were only interested in agronomic factors while in other regions the responses were more toward functional properties. Some families preferred a small kernel.

TABLE 8.1.

CHARACTERISTICS OF A GOOD SORGHUM

	1	2	3	4	5	6	7	8	TOTAL
Large Grain	0	1	32	78	39	81	1	13	245
White Kernel	0	0	9	64	35	74	1	37	220
Floury	0	0	0	0	0	1	0	28	29
Easy to Dehull	0	0	0	0	0	0	5	0	5
Hard	0	0	0	1	28	0	0	1	30
Dry	0	0	0	64	0	0	0	4	68
Agronomic Factors	0	0	65	29	81	0	129	12	316
Total Responses	0	1	67	95	78	85	78	49	453

TABLE   8.2.

CHARACTERISTICS OF A GOOD MILLET

	1	2	3	4	5	6	7	8	TOTAL
Large Grain	0	21	36	100	34	70	0	1	262
Little Hull	0	0	0	0	0	9	0	1	10
Floury	0	2	0	0	1	0	0	10	13
Hard	0	0	2	1	25	0	0	3	31
Dry	0	0	1	68	0	0	0	3	72
Agronomic Factors	0	12	69	29	61	44	165	34	414
Total	0	32	71	100	67	86	97	38	491

TABLE 8.3.

CHARACTERISTICS OF A GOOD MAIZE

	1	2	3	4	5	6	7	8	TOTAL
Large Grain	0	4	6	0	2	69	0	7	88
Whitish Grain	0	0	0	0	11	68	0	4	83
Floury	0	0	0	0	0	1	0	34	35
Yellowish Grain	0	0	13	0	12	14	0	11	50
Agronomic Factors	0	7	32	0	46	0	166	8	259
Total	0	9	37	0	48	86	98	42	320

TABLE 8.4.

CHARACTERISTICS OF A GOOD RICE

	1	2	3	4	5	6	7	8	TOTAL
Not Starchy	0	0	19	0	0	18	0	9	46
Small Grain	0	19	6	0	0	11	0	1	37
White Grain	0	0	0	8	0	0	0	4	12
Doesn't absorb much oil	0	0	11	0	1	0	0	0	12
Broken Kernel	0	0	0	23	0	0	0	0	23
Not Pasty	0	0	0	24	0	0	0	0	24
Long Grain	0	0	0	0	13	0	0	0	13
Agronomic Factors	0	9	0	1	63	8	106	0	187
Total	0	19	22	26	51	22	99	9	248

In response to the need for solid information of this type, the Government of Senegal has asked the Food Technology Institute (ITA) at Dakar to carry out a study of functional properties on different varieties of cereals. There will be some feedback to the plant breeders such that suitable characteristics can be bred into the new varieties. These results should be available from ITA towards 1981.

C H A P T E R   9

WOMENS' WORK

9.1   COLLECTION OF DATA

The data in this section is of two types. The material for
Table 9.1 largely comes from observation by the enumerator or by
recall from the previous day's work by the woman. The material for
Table 9.2 was based on recall ability of the women surveyed. Unlike
the data for Chapters 3-7 which are based largely on the March 1976
sampling period, all the data in this chapter is based on the 717
families that participated in the survey at all three periods.

For coding purposes, it was decided to round off all recorded
time to the nearest hour. On a large proportion, the error
generated by this assumption should sum up to zero. To us, 0 hour
actually means 29 minutes or less while one hour means more than
30 minutes but less than 1 hour 30 minutes.

For persons interested in observing the raw data, the
questionnaires have been left at CNRA, Bambey. Permission to view
these on location can probably be obtained by writing to the
director of the station.

9.2   OBTAINING WATER

The majority of women obtained water in the morning. Only
20.7% of the women spent less than 30 minutes obtaining water in
the morning during March. Surprisingly, this figure decreased in
July (Table 9.1). This would mean that probably some other member
of the family helped get water in July since we know that certain
water sources available in March were not available in July and that
the water table had dropped. The recall (Table 9.2) provided
results that were anticipated. The shorter time in obtaining water
in July could also be explained if the sampling was carried out
after the rains had begun.

9.3   PROCESSING OF GRAIN (DEHULLING - GRINDING)

The families in Bambey and Sédhiou spent more time on dehulling
and grinding than did those in other regions. This activity appears
to be done both in the morning and afternoon but is dependent upon
season. The women generally spend less time on processing during
the rainy season than at other times of the year since they are
probably involved in field work. Normally, they spend about

four hours a day on processing (Table 9.2). In extreme cases, the short time spent on dehulling and grinding was due to lack of adequate food supplies. In the Louga region 85.4% of the women spent less than 30 minutes daily on this task.

9.4 MEAL PREPARATION

The majority of women spent one hour or less on preparation of breakfast (94.4% in March and 95.2% in July). Similarly, the majority of women spent two hours or less on preparation of lunch (88.1% in March and 95.7% in July). Due to the women having to work in the field in July, the mean time for lunch preparation was less. The least time spent appears to be at harvest. The mean time for preparation of dinner also decreased in July. The shorter time used for meal preparation in July was probably due to:

a) less available food
b) longer time needed to obtain water
c) shortage of fuel
d) more pressure on women's time due to field preparation.

In general, much of the wood needed during the rainy season is gathered before the rains. The women appear to spend about two hours a day collecting wood at that time. This drops to about 45 minutes during harvest. During the period in which cash crops are sold, the women average about 1 1/2 hours daily on wood collection (Table 9.2). With wood becoming more scarce, there is an evident need to harness the solar energy available to provide the women an easier means of meal preparation.

9.5 OTHER ACTIVITIES

As can be seen from Table 9.1, apart from day to day work involving water, fuel, processing, meal preparation and working in the field, the women have little or no time to be involved in artisan work, self or child education, sale of goods, visits or leisure time. This is rather unfortunate and must be remedied. There are two ways to help resolve this problem:

a) Reduce the importance of cash crops and place more emphasis on food crops. By so doing, the women will be more available during the periods required to get the food crop into production and later to get it harvested.

b)   Introduce more wells, other fuel sources and mechanical means
     of processing into the village. This time gained could then
     be channeled to more fruitful activities.

     As can be seen from Table 9.3, the Senegalese women probably
average at least 50 hours per week involved in hard physical labour.
Let us not forget that there are no holidays or days off in this
form of life. If the backbone of the country is tomorrow's adult,
then today the mother must have an opportunity to prepare that
child for the future.

TABLE 9.1.

FREQUENCY DISTRIBUTION - NUMBER OF HOURS WORKED

ACTIVITY	PERIOD	TIME	0	1	2	3	4	5	6	7	8	9
OBTAIN WATER	MARCH 76	A.M.	151	284	141	134	20	1	0	0	0	0
			20.7	38.9	19.3	18.3	2.7	0.1				
		PM	584	106	30	11	0	0	0	0	0	0
			79.9	14.5	4.1	1.5						
	JULY 76	A.M.	276	219	156	49	24	7	0	0	0	0
			37.8	30.0	21.3	6.7	3.3	1.0				
		P.M.	602	92	32	3	2	0	0	0	0	0
			82.4	12.6	4.4	0.4	0.3					
DEHULL - GRIND	MARCH	A.M.	340	227	125	27	12	0	0	0	0	0
			46.5	31.1	17.1	3.7	1.6					
		P.M.	336	246	122	22	3	2	0	0	0	0
			46.0	33.7	16.7	3.0	0.4	0.3				
	JULY	A.M.	467	161	84	10	7	2	0	0	0	0
			63.9	22.0	11.5	1.4	1.0	0.3				
		P.M.	536	115	61	14	4	1	0	0	0	0
			73.3	15.7	8.3	1.9	0.5	0.1				
BREAKFAST PREP.	MARCH	A.M.	269	425	19	17	1	0	0	0	0	0
			36.8	58.1	2.6	2.3	0.1					
		P.M.	730	1	0	0	0	0	0	0	0	0
			99.9	0.1								
	JULY	A.M.	337	359	12	22	1	0	0	0	0	0
			46.1	49.1	1.6	3.0	0.1					
		P.M.	727	4	0	0	0	0	0	0	0	0
			99.5	0.5								

			0	1	2	3	4	5	6	7	8	9
LUNCH PREPARATION	MARCH	A.M.	168 23.0	246 33.7	230 31.5	72 9.8	15 2.1	0	0	0	0	0
		P.M.	716 97.9	11 1.5	4 0.5	0	0	0	0	0	0	0
	JULY	A.M.	280 38.3	274 37.5	145 19.8	21 2.9	9 1.2	1 0.1	1 0.1	0	0	0
		P.M.	715 97.8	4 0.5	8 1.1	4 0.5	0	0	0	0	0	0
DINNER PREPARATION	MARCH	A.M.	691 94.5	15 2.1	17 2.3	6 0.8	2 0.3	0	0	0	0	0
		P.M.	211 28.9	154 21.1	282 38.6	55 7.5	25 3.4	4 0.5	0	0	0	0
	JULY	A.M.	648 88.6	23 3.1	55 7.5	5 0.7	0	0	0	0	0	0
		P.M.	346 47.3	216 29.5	114 15.6	34 4.7	19 2.6	2 0.3	0	0	0	0
OBTAIN WOOD	MARCH	A.M.	609 83.3	78 10.7	27 3.7	13 1.8	4 0.5	0	0	0	0	0
		P.M.	607 83.0	102 14.0	14 1.9	4 0.5	3 0.4	1 0.1	0	0	0	0
	JULY	A.M.	677 92.6	27 3.7	20 2.7	4 0.5	2 0.3	1 0.1	0	0	0	0
		P.M.	719 98.4	7 1.0	2 0.3	3 0.4	0	0	0	0	0	0
FIELD WORK	MARCH	A.M.	697 95.3	8 1.1	8 1.1	11 1.5	3 0.4	1 0.1	3 0.4	0	0	0
		P.M.	704 96.3	5 0.7	10 1.4	5 0.7	5 0.7	1 0.1	1 0.1	0	0	0
	JULY	A.M.	422 57.7	30 4.1	70 9.6	51 7.0	56 7.7	74 10.1	22 3.0	6 0.8	0	0
		P.M.	527 72.1	22 3.0	53 7.3	88 12.0	30 4.1	8 1.1	3 0.4	0	0	0

			0	1	2	3	4	5	6	7	8	9
HOUSEWORK	MARCH	A.M.	412	284	24	9	1	1	0	0	0	0
			56.4	38.9	3.3	1.2	0.1	0.1				
		P.M.	664	52	14	1	0	0	0	0	0	0
			90.8	7.1	1.9	0.1						
	JULY	A.M.	439	255	25	9	3	0	0	0	0	0
			60.1	34.9	3.4	1.2	0.4					
		P.M.	696	27	3	2	2	0	0	1	0	0
			95.2	3.7	0.4	0.3	0.3			0.1		
ARTISAN WORK	MARCH	A.M.	673	13	14	21	8	0	2	0	0	0
			92.1	1.8	1.9	2.9	1.1		0.3			
		P.M.	707	3	9	5	4	1	0	1	1	0
			96.7	0.4	1.2	0.7	0.5	0.1		0.1	0.1	0.0
	JULY	A.M.	717	7	1	3	1	2	0	0	0	0
			98.1	1.0	0.1	0.4	0.1	0.3				
		P.M.	722	1	6	1	0	1	0	0	0	0
			98.8	0.1	0.8	0.1		0.1				
CHILD EDUCATION	MARCH	A.M.	724	5	1	0	0	1	0	0	0	0
			99.0	0.7	0.1			0.1				
		P.M.	727	1	1	0	1	1	0	0	0	0
			99.5	0.1	0.1		0.1	0.1				
	JULY	A.M.	721	3	0	2	5	0	0	0	0	0
			98.6	0.4		0.3	0.7					
		P.M.	728	0	0	1	2	0	0	0	0	0
			99.6			0.1	0.3					

			0	1	2	3	4	5	6	7	8	9
SELF-EDUCATION	MARCH	A.M.	727 99.5	3 0.4	0	0	0	1 0.1	0	0	0	0
		P.M.	728 99.6	2 0.3	0	0	0	0	0	0	1 0.1	0
	JULY	A.M.	730 99.9	0	1 0.1	0	0	0	0	0	0	0
		P.M.	731 100.0	0	0	0	0	0	0	0	0	0
SEED PREPARATION	MARCH	A.M.	668 91.4	26 3.6	22 3.0	6 0.8	8 1.1	1 0.1	0	0	0	0
		P.M.	599 81.9	71 9.7	33 4.5	19 2.6	6 0.8	2 0.3	0	1 0.1	0	0
	JULY	A.M.	651 89.1	17 2.3	29 4.0	19 2.6	12 1.6	3 0.4	0	0	0	0
		P.M.	654	17 2.3	42 5.7	11 1.5	43 0.5	0 0.4	0	0	0	0
SALE OF FOODS	MARCH	A.M.	687 94.0	9 1.2	8 1.1	12 1.6	10 1.4	2 0.3	2 0.3	1 0.1	0	0
		P.M.	688 94.1	6 0.8	10 1.4	9 1.2	10 1.4	3 0.4	0	3 0.4	2 0.3	0
	JULY	A.M.	682 93.3	5 0.7	9 1.2	12 1.6	21 2.9	0	2 0.3	0	0	0
		P.M.	692 94.7	2 0.3	4 0.5	9 1.2	7 1.0	5 0.7	11 1.5	1 0.1	0	0

			0	1	2	3	4	5	6	7	8	9
VISITS AND LEISURE	MARCH	A.M.	695	17	8	6	3	1	0	0	0	1
			95.1	2.3	1.1	0.8	0.4	0.1				0.1
		P.M.	628	42	48	12	0	0	0	0	1	0
			85.9	5.7	6.6	1.6					0.1	
	JULY	A.M.	656	17	37	12	6	1	1	0	1	0
			89.7	2.3	5.1	1.6	0.8	0.1	0.1		0.1	
		P.M.	594	51	65	4	9	3	2	3	0	0
			81.3	7.0	8.9	0.5	1.2	0.4	0.3	0.4		
CEREMONIES	MARCH	A.M.	720	1	2	1	5	1	1	0	0	0
			98.5	0.1	0.3	0.1	0.7	0.1	0.1			
		P.M.	718	1	1	4	4	1	1	0	1	0
			98.2	0.1	0.1	0.5	0.5	0.1	0.1		0.1	
	JULY	A.M.	721	1	0	2	5	0	0	0	0	2
			98.6	0.1		0.3	0.7					0.3
		P.M.	719	0	2	0	2	2	2	1	1	2
			98.4		0.3		0.3	0.3	0.3	0.1	0.1	0.3
OTHERS	MARCH	A.M.	517	129	51	21	10	2	0	0	1	0
			70.7	17.6	7.0	2.9	1.4	0.3			0.1	
		P.M.	482	81	47	112	6	0	1	1	1	0
			65.9	11.1	6.4	15.3	0.8		0.1	0.1	0.1	
	JULY	A.M.	612	63	31	14	7	1	0	2	1	0
			83.7	8.6	4.2	1.9	1.0	0.1		0.3	0.1	
		P.M	570	37	15	102	4	1	1	0	1	0
			78.0	5.1	2.1	14.0	0.5	0.1	0.1		0.1	

TABLE 9.2

AVERAGE TIME SPENT ON WORK

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDH	SINTH	TOTAL
MARCH	A.M.	7.3	6.0	4.8	7.0	7.2	4.9	6.7	8.2	6.5
	P.M.	5.3	4.3	3.5	4.3	6.2	3.2	8.8	1.1	4.6
	DAY	12.6	10.3	8.3	11.3	13.3	8.1	15.4	9.4	11.1
JULY	A.M.	8.2	5.3	4.2	5.8	6.0	5.1	8.2	10.0	6.7
	P.M.	3.1	4.3	3.1	3.4	5.1	2.4	9.1	1.2	4.0
	DAY	11.2	9.7	7.3	9.1	11.1	7.6	17.3	11.1	10.6

TABLE 9.3.

RECALL - WOMEN'S WORK FOR SEASON

SEASON	ACTIVITY	0	1	2	3	4	5	6	7	8	9
CASH CROP SALES	OBTAIN WATER	127 17.4	236 32.3	187 25.6	112 15.3	38 5.2	10 1.4	21 2.9	0	0	0
	THRESHING	277 37.9	166 22.7	126 17.2	60 8.2	36 4.9	42 5.7	22 3.0	0	2 0.3	0
	DEHULLING	154 21.1	396 54.2	138 18.9	31 4.2	6 0.8	6 0.8	0	0	0	0
	GRINDING	168 23.0	323 44.2	178 24.4	46 6.3	7 1.0	4 0.5	5 0.7	0	0	0
	OBTAIN WOOD	255 34.9	128 17.5	143 19.6	126 17.2	63 8.6	13 1.8	3 0.4	0	0	0
	COOKING	138 18.9	114 15.6	253 34.6	154 21.1	55 7.5	13 1.8	3 0.4	1 0.1	0	0
	OTHERS	268 36.7	267 36.5	100 13.7	49 6.7	23 3.1	0	4 0.5	16 2.2	4 0.5	0
BEFORE RAINS	OBTAIN WATER	53 7.3	233 31.9	232 31.7	115 15.7	54 7.4	18 2.5	26 3.6	0	0	0
	THRESHING	208 28.5	175 23.9	172 23.5	78 10.7	33 4.5	26 3.6	35 4.8	0	4 0.5	0
	DEHULLING	61 8.3	398 54.4	150 20.5	61 8.3	17 2.3	20 2.7	24 3.3	0	0	0
	GRINDING	95 13.0	362 49.5	202 27.5	49 6.7	10 1.4	9 1.2	5 0.7	0	0	0
	OBTAIN WOOI	173 23.7	127 17.4	160 21.9	141 19.3	55 7.5	37 5.1	24 3.3	12 1.6	2 0.3	0
	COOKING	67 9.2	122 16.7	255 34.9	202 27.6	61 8.3	19 2.6	4 0.5	1 0.1	0	0
	OTHERS	228 31.2	239 32.7	113 15.5	90 12.3	32 4.4	3 0.4	6 0.8	16 2.2	4 0.5	0

SEASON	ACTIVITY	0	1	2	3	4	5	6	7	8	9
DURING RAINS	OBTAIN WATER	91 12.4	377 51.6	202 27.6	34 4.7	13 1.8	7 1.0	7 1.0	0	0	0
	THREESHING	414 56.6	125 17.1	87 11.9	53 7.3	29 4.0	11 1.5	10 1.4	0	2 0.3	0
	DEHULLING	182 24.9	388 53.1	117 16.0	31 4.2	8 1.1	5 0.7	0	0	0	0
	GRINDING	97 13.3	357 48.8	186 25.4	51 7.0	20 2.7	17 2.3	3 0.4	0	0	0
	OBTAIN WOOD	412 56.4	148 20.2	76 10.4	57 7.8	28 3.8	9 1.2	1 0.1	0	0	0
	COOKING	68 9.3	131 17.9	257 35.2	208 28.5	52 7.1	12 1.6	2 0.3	1 0.1	0	0
	OTHERS	242 33.1	270 36.9	72 9.8	43 5.9	43 5.9	38 5.2	18 2.5	1 0.1	4 0.5	0
HARVEST	OBTAIN WATER	152 20.8	227 31.1	192 26.3	110 15.0	27 3.7	6 0.8	17 2.3	0	0	0
	THRESHING	259 35.4	156 21.3	118 16.1	62 8.5	50 6.8	47 6.4	35 4.8	1 0.1	3 0.4	0
	DEHULLING	203 27.8	382 52.3	117 16.0	18 2.5	6 0.8	5 0.7	0	0	0	0
	GRINDING	188 25.7	314 43.0	167 22.8	46 6.3	7 1.0	6 0.8	3 0.4	0	0	0
	OBTAIN WOC	326 44.6	131 17.9	130 17.8	86 11.8	45 6.2	10 1.4	3 0.4	0	0	0
	COOKING	160 21.9	136 18.6	233 31.9	145 19.8	45 6.2	10 1.4	1 0.1	1 0.1	0	0
	OTHERS	288 39.4	242 33.1	94 12.9	62 8.5	20 2.7	2 0.3	4 0.5	16 2.2	3 0.4	0

C H A P T E R   1 0

FUTURE

10.1 PRESENT COMMUNITY INVOLVEMENT

Apart from Louga, Khombole, Bambey and Sédhiou, very few families had any knowledge of the existence of a fund to finance community projects (Table 10.1). The regions of Dagana, Khombole, Bambey and Sédhiou reported the use of communal fields to grow groundnuts which could be sold and the revenue used for community projects (Table 10.2).

10.2 VILLAGE NEEDS

Village needs differ from region to region (Tables 10.3 and 10.4). All the villages surveyed in the Dagana region had access to a river or lake; their interest in wells was minimal. Grinders were however quite important. Wells and grinders were selected as priorities by villages in the Louga, Nioro and Sinthiou regions. Bambey and Fissel families both felt that wells and threshers were their first priorities. Nioro families were only interested in grinders while Sédhiou families felt that wells and dehullers were first priorities. On a national basis, first priority should be given to a water supply and second, grinders should be made available (Table 10.3).

The second choice given was more diversified. Since it was difficult to arrive at something useful, we applied a weight of two to the first choice and a weight of one to the second choice. On that basis, the country considered grinders of prime importance followed closely by wells; a reverse of the first choice considered alone. The other three choices; threshers, improved bins and dehullers, were only considered where they are known because of the efforts by research or extension staff. Based on weighed means, the first and second choice for each region were:

Dagana	grinders, dehullers
Louga	grinders, wells
Khombole	grinders, wells
Bambey	wells, threshers
Fissel	wells, threshers
Nioro	grinders, wells
Sédhiou	wells, dehullers
Sinthiou	grinders, wells

TABLE 10.1.

EXISTENCE OF A COMMUNITY FUND

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	YES	0	8	42	29	7	1	15	0	102
		0.0	7.8	41.2	28.4	6.9	1.0	14.7	0.0	100.0
		0.0	17.0	42.4	30.2	7.1	1.1	15.0	0.0	14.2
2	NO	90	39	57	67	92	91	85	93	614
		14.7	6.4	9.3	10.9	15.0	14.8	13.8	15.1	100.0
		100.0	83.0	57.6	69.8	92.9	98.9	85.0	100.0	85.8
	RESPONSES	90	47	99	96	99	92	100	93	716

TABLE 10.2.

EXISTENCE OF A COMMUNITY FIELD

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	YES	61	1	25	18	7	8	15	0	135
		45.2	0.7	18.5	13.3	5.2	5.9	11.1	0.0	100.0
		67.8	2.1	25.3	18.8	7.1	8.7	15.0	0.0	18.9
2	NO	29	46	74	78	92	84	85	93	581
		5.0	7.9	12.7	13.4	15.8	14.5	14.6	16.0	100.0
		32.2	97.9	74.7	81.3	92.9	91.3	85.0	100.0	81.1
	RESPONSES	90	47	99	96	99	92	100	93	716

TABLE 10.3.

FIRST CHOICE VILLAGE NEEDS

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	WELLS	1	19	37	62	68	7	65	35	294
		0.3	6.5	12.6	21.1	23.1	2.4	22.1	11.9	100.0
		1.2	40.4	37.4	63.9	69.4	7.6	65.7	37.6	41.4
2	DEHULLER	9	0	11	6	1	7	18	0	52
		17.3	0.0	21.2	11.5	1.9	13.5	34.6	0.0	100.0
		10.5	0.0	11.1	6.2	1.0	7.6	18.2	0.0	7.3
3	GRINDER	63	23	36	9	0	75	0	48	254
		24.8	9.1	14.2	3.5	0.0	29.5	0.0	18.9	100.0
		73.3	48.9	36.4	9.3	0.0	81.5	0.0	51.6	35.7
4	THRESHER	2	1	15	19	22	3	7	4	73
		2.7	1.4	20.5	26.0	30.1	4.1	9.6	5.5	100.0
		2.3	2.1	15.2	19.6	22.4	3.3	7.1	4.3	10.3
5	IMPROVED BINS	0	0	0	1	7	0	3	6	17
		0.0	0.0	0.0	5.9	41.2	0.0	17.6	35.3	100.0
		0.0	0.0	0.0	1.0	7.1	0.0	3.0	6.5	2.4
6	OTHERS	11	4	0	0	0	0	6	0	21
		52.4	19.0	0.0	0.0	0.0	0.0	28.6	0.0	100.0
		12.8	8.5	0.0	0.0	0.0	0.0	6.1	0.0	3.0
	RESPONSES	86	47	99	97	98	92	99	93	711

TABLE 10.4.

SECOND CHOICE VILLAGE NEEDS

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	WELLS	4	3	22	8	2	27	1	37	104
		3.8	2.9	21.2	7.7	1.9	26.0	1.0	35.6	100.0
		5.1	6.4	22.2	8.7	2.0	29.3	1.0	39.8	14.9
2	DEHULLER	27	20	7	3	7	23	32	27	146
		18.5	13.7	4.8	2.1	4.8	15.8	21.9	18.5	100.0
		34.6	42.6	7.1	3.3	7.1	25.0	32.3	29.0	20.9
3	GRINDER	13	18	26	47	34	12	2	15	167
		7.8	10.8	15.6	28.1	20.4	7.2	1.2	9.0	100.0
		16.7	38.3	26.3	51.1	34.7	13.0	2.0	16.1	23.9
4	THRESHER	17	2	43	27	27	29	24	8	177
		9.6	1.1	24.3	15.3	15.3	16.4	13.6	4.5	100.0
		21.8	4.3	43.4	29.3	27.6	31.5	24.2	8.6	25.4
5	IMPROVED BINS	0	1	1	7	27	1	9	6	52
		0.0	1.9	1.9	13.5	51.9	1.9	17.3	11.5	100.0
		0.0	2.1	1.0	7.6	27.6	1.1	9.1	6.5	7.4
6	OTHERS	17	3	0	0	1	0	31	0	52
		32.7	5.8	0.0	0.0	1.9	0.0	59.6	0.0	100.0
		21.8	6.4	0.0	0.0	1.0	0.0	31.3	0.0	7.4
	RESPONSES	78	47	99	92	98	92	99	93	698

We will now look at an economic analysis of the cost of introducing the different proposed items to see if the demands of the villagers might be met.

We will assume that wells and improved bins will last 10 years while dehullers, grinders and treshers will last 5 years.

When a loan of V dollars is amortized at a rate of r of interest per payment period of n periods, the payment P is equal to:

$$P = V. \frac{r\,(1 + r)^n}{(1 + r)^n - 1}$$

At an interest rate of 6% per annum, the value of 1 monetary unit over 5 years is 1.18698 and for 10 years it is 1.35868.

If the well can serve the needs of 50 families, the cost per family would be 11,900 francs. From Table 10.5 we note that only 13.8% of the families are willing to contribute more than 5,000 francs to acquire a well and that none of the families, except those at Bambey realize what the cost of a well is.

The cost of a dehuller per family would be 1350 francs (assuming that 1000 families can use the dehuller). From Table 10.6 we see that 41.6% of the families are willing to pay more than 1,000 francs.

Grinders were the first priority. A grinder could probably serve 1,000 families. The cost per family would therefore be 500 francs and it appears that 85% of our sample would probably pay that amount (Table 10.7).

A thresher can probably thresh 5 tonnes per day. Over a 90 day threshing period, it could probably serve the needs of 600 families. The cost per family would therefore be 4,500 francs. In our sample, 26.3% were willing to pay this amount (Table 10.8).

An improved bin can serve 4 families. The cost per family would be 34,000 francs. Very few families could pay this amount (Table 10.9).

If the question was understood, there should be an increased emphasis on the introduction of grinders and dehullers. However, many families may have felt that the answer they gave was a yearly contribution. If this is the case and we assume the smaple is

representative of the population, it would be possible to introduce wells, dehullers, threshers and grinders and improved bins in many of the villages.

10.3 USE OF TIME GAINED THROUGH INTRODUCTION OF NEW TECHNOLOGY

The majority of wives in the four northern regions and Nioro would use any free time for trading (Table 10.10). There was a strong interest in gardening at Fissel. This attitude could have come about because of the training centre run by the Human Resources Division of Senegal in the town of Fissel. If time and water were available, 83.7% of the wives would be prepared to plant their own gardens (Table 10.11). There is some resistance to planting of gardens in the regions of Louga, Khombole and Nioro; however, all three regions are centers where women traders abound.

10.4 PRODUCTION OF OTHER CEREAL GRAINS

If for one reason or another millet could not be grown, most people would try to plant sorghum (Table 10.12). Rice as a crop, in the absence of millet would only be grown at Dagana and Sédhiou while maize would primarily be grown at Nioro. Sanio, a type of millet, appeared to be popular at Louga. From this one can probably conclude that there is a strong reason to continue the improvement of these four crops. Although millet has first priority, the other four crops are parts of different research programs at the national centre for agronomic research at Bambey.

10.5 NEEDS IN RESEARCH

a)   Continued research on millet bread by ITA to reduce the amount of wheat and wheat flour imports coming into Senegal.

b)   Continued research on a substitute for imported rice. This could be either an increased production in local rice varieties or a rice substitute such as the "riz de mais" made from maize grits.

c)   Continued research on varieties of millet, sorghum, maize and rice that will give good yields and at the same time be acceptable to the farmer for different end uses.

d)   Continued research on the different components of post-harvest systems as well as studies of the system as a whole.

e)   Particular attention to improvement of traditional storage methods to reduce losses due to insects, rodents and molds.

TABLE 10.5.

AMOUNT   PEOPLE WERE WILLING TO PAY TO ACQUIRE A WELL

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	NOTHING	0	3	0	6	41	42	31	12	135
		0.0	2.2	0.0	4.4	30.4	31.1	23.0	8.9	100.0
		0.0	8.3	0.0	6.5	41.4	48.3	31.0	13.5	22.2
2	<1000	0	8	34	24	37	43	29	43	218
		0.0	3.7	15.6	11.0	17.0	19.7	13.3	19.7	100.0
		0.0	22.2	34.3	25.8	37.4	49.4	29.0	48.3	35.9
3	1001 - 2000	0	13	19	14	19	2	19	12	98
		0.0	13.3	19.4	14.3	19.4	2.0	19.4	12.2	100.0
		0.0	36.1	19.2	15.1	19.2	2.3	19.0	13.5	16.1
4	2001 - 3000	0	0	4	11	0	0	2	4	21
		0.0	0.0	19.0	52.4	0.0	0.0	9.5	19.0	100.0
		0.0	0.0	4.0	11.8	0.0	0.0	2.0	4.5	3.5
5	3001 - 4000	1	0	0	5	0	0	1	2	9
		11.1	0.0	0.0	55.6	0.0	0.0	11.1	22.2	100.0
		20.0	0.0	0.0	5.4	0.0	0.0	1.0	2.2	1.5
6	4001 - 5000	1	0	6	15	0	0	10	11	43
		2.3	0.0	14.0	34.9	0.0	0.0	23.3	25.6	100.0
		20.0	0.0	6.1	16.1	0.0	0.0	10.0	12.4	7.1
7	>5000	3	12	36	18	2	0	8	5	84
		3.6	14.3	42.9	21.4	2.4	0.0	9.5	6.0	100.0
		60.0	33.3	36.4	19.4	2.0	0.0	8.0	5.6	13.8
	RESPONSES	5	36	99	93	99	87	100	89	608

TABLE 10.6

AMOUNT PEOPLE WERE WILLING TO PAY TO ACQUIRE A DEHULLER

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	NOTHING	0	4	16	7	64	6	29	10	136
		0.0	2.9	11.8	5.1	47.1	4.4	21.3	7.4	100.0
		0.0	9.1	16.2	7.5	64.6	6.5	29.0	11.0	20.6
2	< 1000	0	10	37	33	21	79	23	47	250
		0.0	4.0	14.8	13.2	8.4	31.6	9.2	18.8	100.0
		0.0	22.7	37.4	35.5	21.2	85.9	23.0	51.6	37.8
3	1001 - 2000	1	9	8	19	13	7	20	16	93
		1.1	9.7	8.6	20.4	14.0	7.5	21.5	17.2	100.0
		2.3	20.5	8.1	20.4	13.1	7.6	20.0	17.6	14.1
4	2001 - 3000	0	0	1	10	0	0	14	5	30
		0.0	0.0	3.3	33.3	0.0	0.0	46.7	16.7	100.0
		0.0	0.0	1.0	10.8	0.0	0.0	14.0	5.5	4.5
5	3001 - 4000	0	0	1	0	0	0	6	2	9
		0.0	0.0	11.1	0.0	0.0	0.0	66.7	22.2	100.0
		0.0	0.0	1.0	0.0	0.0	0.0	6.0	2.2	1.4
6	4001 - 5000	0	0	1	11	1	0	4	10	27
		0.0	0.0	3.7	40.7	3.7	0.0	14.8	37.0	100.0
		0.0	0.0	1.0	11.8	1.0	0.0	4.0	11.0	4.1
7	> 5000	42	21	35	13	0	0	4	1	116
		36.2	18.1	30.2	11.2	0.0	0.0	3.4	0.9	100.0
		97.7	47.7	35.4	14.0	0.0	0.0	4.0	1.1	17.5
	RESPONSES	43	44	99	93	99	92	100	91	661

TABLE 10.7.

AMOUNT PEOPLE WERE WILLING TO PAY TO ACQUIRE A GRINDER

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	NOTHING	0	0	10	5	48	3	30	9	105
		0.0	0.0	9.5	4.8	45.7	2.9	28.6	8.6	100.0
		0.0	0.0	10.2	5.4	48.5	3.3	30.0	9.7	15.1
2	<1000	0	8	29	34	38	79	33	42	263
		0.0	3.0	11.0	12.9	14.4	30.0	12.5	16.0	100.0
		0.0	17.8	29.6	37.0	38.4	85.9	33.0	45.2	37.8
3	1001 - 2000	3	16	9	20	12	7	18	18	103
		2.9	15.5	8.7	19.4	11.7	6.8	17.5	17.5	100.0
		3.9	35.6	9.2	21.7	12.1	7.6	18.0	19.4	14.8
4	2001 - 3000	1	0	7	12	0	1	7	5	33
		3.0	0.0	21.2	36.4	0.0	3.0	21.2	15.2	100.0
		1.3	0.0	7.1	13.0	0.0	1.1	7.0	5.4	4.7
5	3001 - 4000	0	0	2	0	0	0	9	1	12
		0.0	0.0	16.7	0.0	0.0	0.0	75.0	8.3	100.0
		0.0	0.0	2.0	0.0	0.0	0.0	9.0	1.1	1.7
6	4001 - 5000	0	0	5	9	1	1	3	13	32
		0.0	0.0	15.6	28.1	3.1	3.1	9.4	40.6	100.0
		0.0	0.0	5.1	9.8	1.0	1.1	3.0	14.0	4.6
7	>5000	73	21	36	12	0	1	0	5	148
		49.3	14.2	24.3	8.1	0.0	0.7	0.0	3.4	100.0
		94.8	46.7	36.7	13.0	0.0	1.1	0.0	5.4	21.3
	RESPONSES	77	45	98	92	99	92	100	93	696

TABLE 10.8.

AMOUNT PEOPLE WERE WILLING TO PAY TO ACQUIRE A THRESHER

	1	2	3	4	5	6	7	8	TOTAL
NOTHING	0	2	0	5	61	8	30	12	118
	0.0	1.7	0.0	4.2	51.7	6.8	25.4	10.2	100.0
	0.0	5.6	0.0	5.4	61.6	8.7	30.0	13.3	18.5
< 1000	0	12	22	26	20	81	20	51	232
	0.0	5.2	9.5	11.2	8.6	34.9	8.6	22.0	100.0
	0.0	33.3	22.2	28.0	20.2	88.0	20.0	56.7	36.4
1000 - 2000	0	2	10	16	15	3	10	10	66
	0.0	3.0	15.2	24.2	22.7	4.5	15.2	15.2	100.0
	0.0	5.7	10.3	17.3	15.2	3.3	10.0	11.0	10.5
2001 - 3000	0	0	1	9	1	0	22	5	38
	0.0	0.0	2.6	23.7	2.6	0.0	57.9	13. 2	100.0
	0.0	0.0	1.0	9.7	1.0	0.0	22.0	5.6	6.0
3001 - 4000	0	0	1	5	0	0	5	3	14
	0.0	0.0	7.1	35.7	0.0	0.0	35.7	21.4	100.0
	0.0	0.0	1.0	5.4	0.0	0.0	5.0	3.3	2.2
4001 - 5000	0	0	4	12	2	0	8	8	34
	0.0	0.0	11.8	35.3	5.9	0.0	23.5	23.5	100.0
	0.0	0.0	4.1	12.9	2.0	0.0	8.0	8.9	5.4
> 5000	27	20	61	20	0	0	5	1	134
	20.1	14.9	45.5	14.9	0.0	0.0	3.7	0.7	100.0
	100.0	55.6	61.6	21.5	0.0	0.0	5.0	1.1	21.0
	27	36	99	93	99	92	100	90	637

TABLE 10.9

AMOUNT PEOPLE WERE WILLING TO PAY TO ACQUIRE IMPROVED BINS

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	NOTHING	0	9	6	9	44	57	31	30	186
		0.0	4.8	3.2	4.8	23.7	30.6	16.7	16.1	100.0
		0.0	31.0	6.1	9.9	44.4	66.3	31.0	33.7	31.1
2	$<$ 1000	0	1	34	6	37	28	21	28	155
		0.0	0.6	21.9	3.9	23.9	18.1	13.5	18.1	100.0
		0.0	3.4	34.3	6.6	37.4	32.6	21.0	31.5	25.9
3	1001 - 2000	0	0	20	19	16	1	9	11	76
		0.0	0.0	26.3	25.0	21.1	1.3	11.8	14.5	100.0
		0.0	0.0	20.2	20.9	16.2	1.2	9.0	12.4	12.7
4	2001 - 3000	0	0	1	7	0	0	24	5	37
		0.0	0.0	2.7	18.9	0.0	0.0	64.9	13.5	100.0
		0.0	0.0	1.0	7.7	0.0	0.0	24.0	5.6	6.2
5	3001 - 4000	0	0	1	5	0	0	9	3	18
		0.0	0.0	5.6	27.8	0.0	0.0	50.0	16.7	100.0
		0.0	0.0	1.0	5.5	0.0	0.0	9.0	3.4	3.0
6	4001 - 5000	0	0	3	11	0	0	5	9	28
		0.0	0.0	10.7	39.3	0.0	0.0	17.9	32.1	100.0
		0.0	0.0	3.0	12.1	0.0	0.0	5.0	10.1	4.7
7	$>$ 5000	5	19	34	34	2	0	1	3	98
		5.1	19.4	34.7	34.7	2.0	0.0	1.0	3.1	100.0
		100.0	65.5	34.3	37.4	2.0	0.0	1.0	3.4	16.4
	RESPONSES	5	29	99	91	99	86	100	89	598

TABLE 10.10

UTILISATION OF FREE TIME IF MACHINES WERE INTRODUCED INTO THE VILLAGE

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	SMALL ANIMAL RAISING	16	3	28	10	12	7	34	35	145
		11.0	2.1	19.3	6.9	8.3	4.8	23.4	24.1	100.0
		18.2	6.8	28.6	10.4	12.2	7.6	34.0	37.6	20.5
2	TRADING	43	28	49	44	21	59	40	34	318
		13.5	8.8	15.4	13.8	6.6	18.6	12.6	10.7	100.0
		48.9	63.6	50.0	45.8	21.4	64.1	40.0	36.6	44.9
3	GARDENING	11	5	7	14	45	18	25	17	142
		7.7	3.5	4.9	9.9	31.7	12.7	17.6	12.0	100.0
		12.5	11.4	7.1	14.6	45.9	19.6	25.0	18.3	20.0
4	ARTISAN WORK	17	5	4	17	3	7	0	6	59
		28.8	8.5	6.8	28.8	5.1	11.9	0.0	10.2	100.0
		19.3	11.4	4.1	17.7	3.1	7.6	0.0	6.5	8.3
5	OTHERS	1	3	10	11	17	1	1	1	45
		2.2	6.7	22.2	24.4	37.8	2.2	2.2	2.2	100.0
		1.1	6.8	10.2	11.5	17.3	1.1	1.0	1.1	6.3
	RESPONSES	88	44	98	96	98	92	100	93	709

TABLE 10.11

PREPARATION OF A GARDEN IF TIME AND WATER AVAILABLE

		DAGA NA	LOUG A	KHOM BOLE	BAMB EY	FISS EL	NIOR O	SEDH IOU	SINT HIOU	TOTAL
1	YES	82	30	69	85	91	59	89	90	595
		13.8	5.0	11.6	14.3	15.3	9.9	15.0	15.1	100.0
		93.2	65.2	69.7	89.5	91.9	64.1	89.9	96.8	83.7
2	NO	6	16	30	10	8	33	10	3	116
		5.2	13.8	25.9	8.6	6.9	28.4	8.6	2.6	100.0
		6.8	34.8	30.3	10.5	8.1	35.9	10.1	3.2	16.3
	RESPONSES	88	46	99	95	99	92	99	93	711

TABLE 10.12.

PRODUCTION OF CEREAL GRAIN IF MILLET COULD NOT BE GROWN

		DAGANA	LOUGA	KHOMBOLE	BAMBEY	FISSEL	NIORO	SEDHIOU	SINTHIOU	TOTAL
1	SORGHUM	22	1	49	68	41	7	17	62	267
		8.2	0.4	18.4	25.5	15.4	2.6	6.4	23.2	100.0
		24.4	2.3	51.0	77.3	41.4	8.0	17.2	66.7	38.3
2	MAIZE	0	9	1	1	0	65	6	22	104
		0.0	8.7	1.0	1.0	0.0	62.5	5.8	21.2	100.0
		0.0	20.5	1.0	1.1	0.0	73.9	6.1	23.7	14.9
3	WHEAT	0	0	0	0	0	1	0	1	2
		0.0	0.0	0.0	0.0	0.0	50.0	0.0	50.0	100.0
		0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.1	0.3
4	RICE	68	9	2	1	12	5	76	7	180
		37.8	5.0	1.1	0.6	6.7	2.8	42.2	3.9	100.0
		75.6	20.5	2.1	1.1	12.1	5.7	76.8	7.5	25.8
5	SANIO	0	17	29	0	28	9	0	1	84
		0.0	20.2	34.5	0.0	33.3	10.7	0.0	1.2	100.0
		0.0	38.6	30.2	0.0	28.3	10.2	0.0	1.1	12.1
6	OTHERS	0	8	15	18	18	1	0	0	60
		0.0	13.3	25.0	30.0	30.0	1.7	0.0	0.0	100.0
		0.0	18.2	15.6	20.5	18.2	1.1	0.0	0.0	8.6
	RESPONSES	90	44	96	88	99	88	99	93	697

C H A P T E R 1 1

CONCLUSIONS

The authors learned a great deal about their methodology for this study and would like to point out the following facts for the benefit of anyone considering further studies of this nature.

1. The amount of extra information gained from a three-season study is not justified by the extra cost. Studies on the use of women's time should, however, be studied at greater depth than was done for this study.

2. The idea of managing eight teams on the field simultaneously is a bit complex. Unless the time element is critical, this would be better if spread out over a longer time period by using fewer teams.

3. Questions dealing with people's revenue should not be asked unless a working liaison has already been established.

4. There are pros and cons to the use of closed questionnaires (multiple choice). In spite of the problems, we feel that if the people drawing up the questionnaire are conversant with the subject, it is an excellent method since tabulation of results is straight forward. For fact finding surveys, open-ended questions may be more suitable, although they would be difficult to analyze.

5. Coding from questionnaires to coding sheets should be done by one person. This reduces the number of key-punching errors since the style of writing changes from person to person.

The results of this survey as produced in this publication reflect the thoughts of the authors and are open to interpretation. The authors do, however, accept full responsibility for the contents of this publication.

A P P E N D I X   1
XXXXXXXXXXXXXXXXXXXXXXXXXXXXX

S U R V E Y   Q U E S T I O N N A I R E
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

U S E D   I N   M A R C H   A N D   J U L Y ,
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

1 9 7 6
XXXXXXXXX

NAME OF FAMILY   _____

VILLAGE   _____

REGION   _____

ENUMERATOR   _____

QUESTIONNAIRE NUMBER   _____

I. INTRODUCTION
XXXXXXXXXXXXXXXXXXXXXXXX

1) <u>REGION</u>   _____

    1. Dagana
    2. Louga
    3. Khombole
    4. Bambey
    5. Fissel
    6. Nioro
    7. Sédhiou
    8. Sinthiou-Malème

2) <u>ETHNIC ORIGIN</u>   _____

    1. Ouoloff
    2. Peulh
    3. Toucouleur
    4. Sérère
    5. Diola
    6. Bambara
    7. Sarakhole
    8. Mandingue
    9. Others

3) <u>RELIGION</u>   _____

    1. Moslem
    2. Christian
    3. Others

4) <u>AGE OF SURVEYED WOMAN</u>   _____

    1. 0-20 years
    2. 21-30 years

    3. 31-40 years

    4. 41-50 years

    5. More than 50 years

5) <u>MARITAL STATUS</u>   _____

    1. Single

    2. Maried

    3. Divorced

    4. Widowed

6) <u>NUMBER OF MATES</u>   _____

7) <u>NUMBER OF BEDROOM AVAILABLE</u>   _____

8) <u>NUMBER OF CHILDREN</u>

    a) Male from 0 to 2 vears   _____

    b) Female from 0 to 2 years   _____

    c) Male from 3 to 6 vears   _____

    d) Female from 3 to 6 years   _____

    e) Male from 7 to 16 years   _____

    f) Female from 7 to 16 years   _____

    g) Male older than 16 years   _____

    h) Female older than 16 years _____

9) <u>NUMBER OF CHILDREN GOING REGULARLY TO SCHOOL</u>

    a) Male from 7 to 12 years   _____

    b) Female from 7 to 12 years _____

    c) Male from 13 to 16 years   _____

    d) Female from 13 to 16 years _____

    e) Male older than 16 years   _____

    f) Female older than 16 years _____

10) <u>TOTAL NUMBER OF PERSONS WHO SHARED THE MEAL WITH</u>

    <u>THE FAMILY YESTERDAY EVENING</u>

a) Children male   _____

b) Children female   _____

c) Adults male   _____

d) Adults female   _____

11) <u>ACTIVITIES OF THE WOMAN THIS SEASON</u>

    (INDICATE THE AMOUNT OF THE REVENUE IN CFA)

a) Dominant activity   _____

b) Secondary activity   _____

c) Revenue of the dominant activity   _____

d) Revenue of the secondary activity   _____

<u>Code for activities</u>   <u>Code for revenue</u>

1) Agriculture   0. 0

2) Seasonal labor   1. 1 - 5,000

3) Artisan work   2.5001-10,000

4) Sale of foodstuffs   3.10001-15,000

5) Trader   4.15001-20,000

6) Other   5.More than 20,000

12) <u>UTILIZATION OF THE WOMAN'S REVENUE THIS SEASON</u>

a) Personal   _____

b) Foodstuffs   _____

c) Other purchases for the house   _____

d) Others   _____

13) <u>DIVISION OF THE WOMAN'S WORKING HOURS YESTERDAY</u>

    (INDICATE THE NUMBER OF HOURS)

a) Dominant activity - morning   _____

b) Dominant activity - evening   _____

c) Secondary activity - morning   _____

d) Secondary activity - evening   _____

14) THE MAN'S ACTIVITIES THIS SEASON
   (INDICATE THE AMOUNT OF THE REVENUE IN CFA)

    a) Dominant activity   _____

    b) Secondary activity   _____

    c) Revenue of the dominant activity   _____

    d) Revenue of the secondary activity   _____

Code_for_activities   Code_for_revenue

1. Agriculture   0.   0

2. Herdsmen   1.   1-5,000

3. Blacksmith   2. 5001-10,000

4. Salaried employee   3.10001-20,000

5. Tradesman   4.20001-50,000

6. Others   5. More than 50,000

15) DIVISION OF THE MAN WORKING HOURS YESTERDAY

    a) Dominant activity - morning   _____

    b) **Dominant** activity - evening   _____

    c) Secondary activity - morning   _____

    d) Secondary activity - evening   _____

16) EDUCATION

    a) Of the wife   _____

    b) Of the husband   _____

Code_for_education

1. Iliterate
2. Coranic from 0 to 4 years
3. Coranic from 5 to 9 years
4. Coranic more than 9 years
5. C.E.P.
6. Brevet or better
7. Traditional
8. Technical
9. Others

17) TYPE OF HOUSE

    a) Wall   _____

    b) Roof   _____

Code for type of wall

1. Banco
2. Straw
3. Cement
4. Sheet iron
5. Others

Code for type of roof

1. Straw
2. Cement fibre
3. Galvanized iron sheet
4. Terraced
5. Tile
6. Others

18 CEREALS USED AS FOOD

    a) First choice   _____

    b) Second choice   _____

    c) Third choice   _____

Designation of the cereals

1. Millet   _____

2. Sorghum   _____

3. Maize   _____

4. Rice   _____

5. Others   _____

19) LEGUMES USED WITH THE CEREALS FOR FOOD

    a) First Choice   _____

    b) Second choice   _____

Designation of the legumes

1. Groundnuts
2. Cowpeas
3. Others

20) <u>ORGANIZATION OF THE WOMAN'S WORK YESTERDAY</u>

TIME	ACTIVITY	HOW DONE e.g. by hand, machine, other persons, etc.......

II. H A R V E S T I N G   -   T H R E S H I N G   -   D R Y I N G
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

21) DATE OF THRESHING (SHELLING)

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Others   _____

Designation of the date

1. At harvest

2. According to need

3. Availability of machine

22) AVAILABILITY OF THE THRESHING MACHINE:

    Are there threshing machines for: (write 1 if yes and 2 if no)

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Others   _____

23) DO THE WOMEN USE A THRESHING MACHINE, IF ONE EXISTS IN THE VILLAGE?

    (write 1 if yes, and 2 if no)

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Others   _____

24) WHAT PRICE WILL THE WOMAN ACCEPT TO PAY FOR THRESHING OUTSIDE THE HOUSE?

    (price in CFA/kg)

20) <u>ORGANIZATION OF THE WOMAN'S WORK YESTERDAY</u>

TIME	ACTIVITY	HOW DONE e.g. by hand, machine, other persons, etc.......

II. H A R V E S T I N G - T H R E S H I N G - D R Y I N G
𝚇𝚇

21) <u>DATE OF THRESHING (SHELLING)</u>

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Others   _____

<u>Designation of the date</u>

1. At harvest

2. According to need

3. Availability of machine

22) <u>AVAILABILITY OF THE THRESHING MACHINE:</u>

    Are there threshing machines for: (write 1 if yes and 2 if no)

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Others   _____

23) <u>DO THE WOMEN USE A THRESHING MACHINE, IF ONE EXISTS IN THE VILLAGE?</u>
    (write 1 if yes, and 2 if no)

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Others   _____

24) <u>WHAT PRICE WILL THE WOMAN ACCEPT TO PAY FOR THRESHING OUTSIDE THE HOUSE?</u>
    (price in CFA/kg)

a) Millet   _____

b) Sorghum   _____

c) Rice   _____

d) Maize   _____

e) Cowpeas   _____

f) Others   _____

III. S T O R A G E
XXXXXXXXXXXXXXXXXXXXXX

25) DO YOU STORE YOUR GRAIN?   _____

    1. Yes

    2. No

26) IF YES, DO YOU HAVE THE FOLLOWING PROBLEMS:

    a) No place for storing   _____

    b) Grains infested by insects   _____

    c) Grains with mould   _____

    d) Germination problems   _____

    e) Problem of theft or fire   _____

    f) Rodents   _____

27) IF YES, HOW MANY KILOS DO YOU HAVE IN STOCK TODAY?

    a) Millet   _____   <u>Code for quantities</u>

    b) Sorghum   _____   1. < 10kg

    c) Rice   _____   2. 10-100kg

    d) Maize   _____   3. 100-1000kg

    e) Others   _____   4 > 1000kg

28) DO YOU THINK THAT THE QUANTITY OF GRAINS THAT YOU HAVE IN
STOCK WILL BE SUFFICIENT FOR THIS SEASON?   _____

    1. Yes

    2. No

29) <u>STORAGE METHODS AT THE FARMER LEVEL</u>

	<u>1</u>	<u>2</u>	<u>3</u>
a) Millet - first choice			
b) Millet - second choice			
c) Sorghum - first choice			
d) Sorghum - second choice			
e) Rice - First choice			
f) Rice - second choice			
g) Maize - first choice			
h) Maize - second choice			
i) Others - first choice			
j) Others - second choice			

<u>Code for method (first column)</u>

1. On ear , pod, or head
2. In pots
3. Earthen silo
4. Grenier
5. Cement silo
6. In bags
7. In calabash or copper pan
8. In glass jars
9. Others

<u>Code for second column</u>

1. Method is satisfactory
2. Method is unsatisfactory

<u>Designation for third column</u>

1. Non-threshed/without insecticides
2. Non-threshed/with insecticides
3. Threshed/without insecticides
4. Threshed/with insecticides
5. Partly threshed/without insecticides
6. Partly threshed/with insecticides

30) <u>DO YOU MIX TWO OR THREE TYPES OF GRAIN AFTER THRESHING?</u> _____

    1. Yes

    2. No

31) <u>DO YOU MIX GRAIN AND SAND FOR STORAGE?</u> _____

    1. Yes

    2. No

32) <u>IF YES, DO YOU HAVE PROBLEMS IN SEPARATING THE GRAIN FROM THE SAND?</u> _____

    1. Yes

    2. No

33) <u>IF THERE IS NO PROBLEM IN SEPARATING THE GRAIN FROM THE SAND</u>
    <u>WHICH METHOD DO YOU USE</u> (write 1 if yes, 2 if no for each method)

    a) Sifting _____

    b) Winnowing _____

    c) Others _____

34) <u>DO YOU MIX ASH WITH GRAIN?</u> _____

    1. Yes

    2. No

35) <u>IF YES, DO YOU HAVE PROBLEMS WITH SEPARATION?</u> _____

    1. Yes

    2. No

36) <u>IF THERE IS NO PROBLEM WITH SEPARATION OF GRAIN FROM THE ASH,</u>
    <u>WHICH METHOD DO YOU USE?</u> (write 1 if yes, 2 if no for each method)

    a) Sifting _____

    b) Winnowing _____

    c) Others _____

37) WHO GUARANTEES THE STORAGE OF THE GRAIN IN THE HOUSEHOLD? _____

    1. The head of the coumpound

    2. The head of the household

    3. The wife

    4. Others

IV. DISTRIBUTION OF THE GRAINS
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

38) WHO HAS THE RIGHT TO SELL FOOD GRAINS? _____

    1. Head of the compound

    2. Head of the household

    3. Wife

    4. Others

39) WHO DECIDES ON THE SALE OF THESE FOOD GRAINS? _____

    1. Head of the Compound

    2. Head of the household

    3. Wife

    4. Others

40) FROM WHERE DID YOU GET THE GRAIN FOR YESTERDAY'S MEAL
    (write 1 if yes, 2 if no)

    a) Grown on own field _____

    b) Purchase _____

    c) Gift _____

    d) Barter _____

41) WHO RECEIVED THE GRAIN FOR YESTERDAY'S MEAL? _____

    1. The wife

    2. The elder daughter

    3. The mother-in-law

    4. Others

42) HOW OFTEN IS THE GRAIN GIVEN FOR PREPARATION OF THE MEAL? _____

1. Every day
2. Every two days
3. Every three days
4. Once a week
5. Twice a month
6. Once a month
7. Others

43) WHAT IS THE QUANTITY OF GRAIN RECEIVED PER DAY? _____

    1. 1 to 5kg
    2. 6 to 10kg
    3. 11 to 15 kg
    4. 16 to 20 kg
    5. More than 20 kg

44) HOW IS THE GRAIN RECEIVED FOR PREPARATION OF MEALS _____

    1. Threshed
    2. Non-threshed

V. DEHULLING - GRINDING
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

45) WHAT TYPE OF GRAIN DID YOU DEHULL YESTERDAY? _____

    1. Millet
    2. Sorghum
    3. Maize
    4. Others

46) WHAT WAS THE QUANTITY OF GRAIN DEHULLED YESTERDAY? _____

    1.   2kg
    2. 3 to 5kg
    3. 5 to 10kg
    4. More than 10kg

47) TIME EMPLOYED FOR DEHULLING _____

    1. Less than 15mn

    2. 15 to 30mn

    3. 30 to 60mn

    4. More than 60mn

48) AMOUNT OF MONEY SPENT FOR DEHULLING YESTERDAY _____

    1. Nothing

    2. Less than 50F

    3. 51 to 100F

    4. 101 to 200F

    5. More than 200F

49) TIME EMPLOYED FOR GRINDING OF GRAIN _____

    1. Less than 15mn

    2. 15 to 30mn

    3. 30 to 60mn

    4. More than 60mn

50) AMOUNT OF MONEY SPENT FOR THE GRINDING OF GRAIN _____

    1. Nothing

    2. Less than 50F

    3. 51 to 100F

    4. 101 to 200F

    5. More than 200F

51) MILLING FRACTIONS

    a) What is the proportion of hull _____

    b) What is the proportion of flour _____

    c) What is the proportion of grits _____

Code for milling fractions

1) 0 - 10%	3. 21 - 30%	5. 41 - 50%	7. ≥60%
2)11 - 20%	4. 31 - 40%	6. 51 - 60%	

55) <u>DURING THIS SEASON DID YOU SELL THE FIRST PRODUCT AND BUY THE SECOND ONE?</u> (write 1 if yes, 2 if no)

    a) Paddy - rice   _____

    b) Millet - flour for couscous   _____

    c) Groundnuts - groundnuts oil   _____

    d) Groundnuts - peanuts butter   _____

    e) Palmist - palm oil   _____

    f) Tomato - tomato sauce   _____

VII. COMMERCIALIZATION
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

56) <u>SALE OF GRAINS</u>

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Groundnuts   _____

    f) Others   _____

<u>Code for place of sale</u>

1. ONCAD
2. Market
3. Tradsmen
4. Head of household
5. Others

57) <u>PERIOD OF SALE</u>

    a) Millet   _____

    b) Sorghum   _____

    c) Rice   _____

    d) Maize   _____

    e) Groundnuts   _____

    f) Others   _____

VI. P R E P A R A T I O N
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

52) <u>WHAT MEAL DID YOU PREPARE YESTERDAY AT NOON?</u>

53) <u>WHAT WAS THE MEAL PREPARED LAST NIGHT</u>

<u>Code for meals</u>

1. Lakh	10. Mafé	19. Ndiordi
2. Couscous	11. Nielang	20. Ndambé
3. Riz aux poissons	12. Lakhou Bissap	21. Sah
4. Thialale	13. Sokh-Sol	22. Niankatang
5. Riz à la viande	14. Niery Bouna	23. Caldou
6. Gar	15. Mbakhalou Saloum	24. Yassa
7. Gossi	16. Mouldé	25. Fitafou
8. Fondé	17. Thiagri	26. Tô
9. Dakhine	18. Diouka	27. Others

54) <u>DO YOU OFTEN BUY THE FOLLOWINGS</u> (write 1 if yes, 2 if no):

   a) Bread   _____

   b) Sugar   _____

   c) Tea   _____

   d) Coffee   _____

   e) Powder milk   _____

   f) Milk in bottle or in tin   _____

   g) Tomato puree   _____

   h) Wheat flour   _____

   i) Maize semolina   _____

   j) Biscuits   _____

   k) Vinegar   _____

   l) Pepper   _____

   m) Salt   _____

   n) Potatoes   _____

   o) Pasta   _____

Code for sale period

1. Time of harvesting
2. Following the need
3. Others

VIII. INFRASTRUCTURE
ЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖ

58) INDICATE THE PRESENCE OF THE FOLLOWING:

(write 1 if yes, 2 if no)

a) School _____

b) Dispensary _____

c) Maternity _____

d) Railway station _____

e) Post office _____

f) Electricity _____

g) Market _____

h) Road or track _____

i) Cooperative _____

j) Church or mosquee _____

k) Slaughter house _____

l) Vaccination centre _____

m) Secco-ONCAD _____

n) Youth house _____

o) Kindergarten _____

p) Nutritional centre _____

q) C.E.R. _____

r) Football field _____

IX. WATER AND FUEL
ЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖЖ

59) WHICH FUELS DID YOU USE YESTERDAY FOR COOKING?

(write 1 if yes, 2 if no)

a) Wood _____

b) Coal _____

c) Gas _____

d) Others _____

60) <u>HOW MANY TIMES A DAY DO YOU USE FUELS</u> _____

61) <u>HOW MUCH DID YOU PAY YESTERDAY FOR THE UTILIZATION OF YOUR FUEL?</u> _____

<u>Code for price of fuels</u>

1.   0 - 50F

2.   51 -100F

3.   100F

62) <u>NUMBER OF WELLS IN THE VILLAGE?</u> _____

63) <u>DEPTH OF THE WELLS?</u> _____

<u>Code for depth of wells</u>

1. $<$ 5m

2.   6-10m

3.   11-20m

4. $>$20m

64) <u>DISTANCE BETWEEN THE WELL AND THE HOUSE?</u> _____

oooooo000000oooooo

A P P E N D I X   2
XXXXXXXXXXXXXXXXXXX

P O S T   H A R V E S T   D I V I S I O N
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

N A T I O N A L   P O S T - H A R V E S T   S U R V E Y
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

P E R I O D E   3
XXXXXXXXXXXXXXXXX

REGION   _____

QUESTIONNAIRE NUMBER   _____

FAMILY NAME   _____

ENUMERATOR   _____

VILLAGE   _____

I. N U T R I T I O N
XXXXXXXXXXXXXXXX

1.　　　DOES YOUR FAMILY EAT MEAT?

(1) Never

(2) Less than once a week

(3) Once a week

(4) Twice a week

(5) Three times a week

(6) More than three times a week

2.　　　DOES YOUR FAMILY EAT FISH?

(1) Never

(2) Less than once a week

(3) Once a week

(4) Twice a week

(5) Three times a week

(6) More than three times a week

3.　　　DOES YOUR FAMILY DRINK MILK?

(1) Never

(2) Less than once a week

(3) Once a week

(4) Twice a week

(5) Three times a week

(6) More than three times a week

4.　　　DOES YOUR FAMILY EAT EGGS?

(1) Never

(2) Less than once a week

(3) Once a week

(4) Twice a week

(5) Three times a week

(6) More than three times a week

.../

5.   DOES YOUR FAMILY EAT FRUIT?   _____

      (1) Never

      (2) Less than once a week

      (3) Once a week

      (4) Twice a week

      (5) Three times a week

      (6) More than three times a week

6. DOES YOUR FAMILY EAT VEGATABLES?   _____

      (1) Never

      (2) Less than once a week

      (3) Once a week

      (4) Twice a week

      (5) Three times a week

      (6) More than three times a week

7.   DOES YOUR FAMILY EAT PULSES, NUTS OR SEEDS?   _____

      (1) Never

      (2) Less than once a week

      (3) Once a week

      (4) Twice a week

      (5) Three times a week

      (6) More than three times a week

8.   DOES YOUR FAMILY EAT HONEY OR SUGAR?   _____

      (1) Never

      (2) Less than once a week

      (3) Once a week

      (4) Twice a week

      (5) Three times a week

      (6) More than three times a week

9.   CEREALS USED FOR MEALS

    (a) <u>First choice</u>   _____

        (1) Millet
        (2) Sorghum
        (3) Rice
        (4) Maize
        (5) Others

    (b) <u>Second choice</u>   _____

        (1) Millet
        (2) Sorghum
        (3) Rice
        (4) Maize
        (5) Others

    (c) <u>Third choice</u>   _____

        (1) Millet
        (2) Sorghum
        (3) Rice
        (4) Maize
        (5) Others

10. CEREALS PREFERRED FOR MEALS

    (a) <u>First choice</u>   _____

        (1) Millet
        (2) Sorghum
        (3) Rice
        (4) Maize
        (5) Others

    (b) <u>Second choice</u>   _____

        (1) Millet
        (2) Sorghum
        (3) Rice
        (4) Maize
        (5) Others

11. NUMBER OF PEOPLE EATING WITH YOU YESTERDAY   _____

    (1) Less than 5
    (2) 6 - 10
    (3) 11 - 15
    (4) 16 - 20
    (5) More than 20

12. WHAT DID YOUR CHILDREN EAT BEFORE BEING WEANED

    (1) Same as adults   _____
    (2) Home prepared meal for child
    (3) Purchased baby food
    (4) Others

13. WHAT DID YOUR CHILDREN UNDER 3 YEARS EAT AFTER BEING WEANED

    (1) Same as adults   _____
    (2) Home prepared meal for child
    (3) Purchased baby food
    (4) Others

14. WHAT QUANTITY OF GRAIN DO YOU HAVE ON HAND?

    (a) Millet   _____
    (b) Sorghum   _____
    (c) Rice   _____
    (d) Maize   _____
    (e) Cowpeas   _____
    (f) Others   _____

15. DO YOU CONSIDER YOUR STOCK OF GRAIN ADEQUATE UNTIL THE NEXT HARVEST?

    (a) Millet   1. Yes   _____
                    2. No
    (b) Sorghum   1. Yes   _____
                    2. No
    (C) Rice   1. Yes   _____
                    2. No

(d) Maize   1. Yes   _____

                          2. No

(e) Cowpeas   1. Yes   _____

                          2. No

(f) Others   1. Yes   _____

                          2. No

II. WOMAN'S WORK
XXXXXXXXXXX

16. ALLOCATION OF WOMAN'S TIME YESTERDAY

    (a) Number of hours for obtaining water   _____

    (b) Number of hours for threshing   _____

    (c) Number of hours for dehulling   _____

    (d) Number of hours for grinding   _____

    (e) Number of hours for obtaining wood   _____

17. INDICATE THE NUMBER OF HOURS PER DAY, PER SEASON USED FOR EACH TASK

TASK	Sale of Groundnuts	Before rainy season	Rainy season	Harvest
Obtaining water	a)	b)	c)	d)
Threshing	e)	f)	g)	h)
Dehulling	i)	j)	k)	l)
Grinding	m)	n)	o)	p)
Obtaining wood	q)	r)	s)	t)
Cooking	u)	v)	w)	x)
Others	y)	z)	aa)	bb)

III. F U TU R E N E E D S
XXXXXXXXXXXXXXXXXXXXX

18. DO YOU HAVE A COMMUNITY FUND TO PURCHASE ITEMS FOR THE VILLAGE

    (a) Yes   _____

    (b) No

19. IS THERE A COOPERATIVE FIELD

    (a) Yes   _____

    (b) No

20. WHAT SUM DO YOU THINK REMAINS IN THIS FUND AFTER ALL SEASONAL
INCOME AND EXPENSES HAVE BEEN CALCULATED   _____

    (1) Less than 10.000 Frs

    (2) 10.001 - 20.000 Frs

    (3) 20.001 - 50.000 Frs

    (4) 50.001 - 100.000 Frs

    (5) More than 100.000 Frs

21. ENUMERATE THE NEEDS OF YOUR VILLAGE

    (a) First Choice   _____

        (1) Wells

        (2) Dehuller

        (3) Grinder

        (4) Thresher

        (5) Improved Bins

        (6) Others

    (b) Second Choice   _____

        (1) Wells

        (2) Dehuller

        (3) Grinder

        (4) Thresher

        (5) Improved Bins

        (6) Others

(c) <u>Third_Choice</u>   _____

    (1) Wells

    (2) Dehuller

    (3) Grinder

    (4) Thresher

    (5) Improved Bins

    (6) Others

22. WHAT AMOUNT WOULD YOU BE WILLING TO PAY TO ACQUIRE THE FOLLOWING EQUIPMENT?

    (a) Wells - cost 500.000   _____

        (1) Nothing

        (2) Less than 1.000 Frs

        (3) 1.001 - 2.000 Frs

        (4) 2.001 - 3.000 Frs

        (5) 3.001 - 4.000 Frs

        (6) 4.001 - 5.000 Frs

        (7) More than 5.000 Frs

    (b) Dehuller - cost 1.000.000   _____

        (1) Nothing

        (2) Less than 1.000 Frs

        (3) 1.001 - 2.000 Frs

        (4) 2.001 - 3.000 Frs

        (5) 3.001 - 4.000 Frs

        (6) 4.001 - 5.000 Frs

        (7) More than 5.000 Frs

    (c) Grinder - cost 300.000   _____

        (1) Nothing

        (2) Less than 1.000 Frs

        (3) 1.001 - 2000 Frs

        (4) 2.001 - 3.000 Frs

        (5) 3.001 - 4.000 Frs

        (6) 4.001 - 5.000 Frs

        (7) More than 5.000 Frs

(d) Thresher   -   cost 2.000.000   _____

    (1) Nothing

    (2) Less than 1.000 Frs

    (3) 1.001 - 2.000 Frs

    (4) 2.001 - 3.000 Frs

    (5) 3.001 - 4.000 Frs

    (6) 4.001 - 5.000 Frs

    (7) More than 5.000 Frs

(e) Improved Bins   - cost 100.000 for a 10 tons silo   _____

    (1) Nothing

    (2) Less than 1.000 Frs

    (3) 1.001 - 2.000 Frs

    (4) 2.001 - 3.000 Frs

    (5) 3.001 - 4.000 Frs

    (6) 4.001 - 5.000 Frs

    (7) More than 5.000 Frs

23. IF YOU HAD A DEHULLER, A GRINDER OR A THRESHER IN THE VILLAGE HOW WOULD
YOU USE THE EXTRA FREE TIME?   _____

    (1) Raising small animals

    (2) Trader

    (3) Market garden

    (4) Artisan work

    (5) Other

24. IF YOU HAD A WELL WITH A PUMP IN YOU VILLAGE WOULD YOU BE WILLING TO
CULTIVATE A SMALL GARDEN?

    (a) Yes   _____

    (b) No

25. TRAINING OF WOMAN FNUMFRATED

    (1) Literate   _____

    (2) Illiterate

IV. T E C H N O L O G Y
XXXXXXXXXXXXXXXXXX

26. IF YOU HAD NO MILLET TO EAT OR YOU WERE NOT ABLE TO GROW MILLET, WHAT OTHER CEREAL WOULD YOU GROW FOR YOUR FOOD SUPPLY?

     (1) Sorghum
     (2) Maize   _____
     (3) Wheat
     (4) Rice
     (5) Sanio
     (6) Others

27. IF THERE WERE NO LONGER ANY TALL SORGHUMS HOW WOULD YOU MAKE YOUR FENCES?

(a) Dwarf sorghum	1. Yes		_____
	2. No		
(b) Souna	1. Yes		_____
	2. No		
(c) Maize	1. Yes		_____
	2. No		
(d) Wood	1. Yes		_____
	2. No		
(e) Iron Sheet	1. Yes		_____
	2. No		
(f) Andropogon	1. Yes		_____
	2. No		
(g) Others	1. Yes		_____
	2. No		

28. ANSWER PARTS a, b, c and/or d IF POSSIBLE

     (a) What qualities should a good sorghum have?

     (b) What qualities should a good millet have?

     (c) What qualities should a good maize have?

     (d) What qualities should a good rice have?

V. CONCLUSION
XXXXXXXXXXXXXXXXX

29. DID YOU FIND THIS SURVEY INTERESTING?   _____

    (1) Yes

    (2) No

30. WOULD YOU PARTICIPATE IN FUTURE ACTIONS IF THERE WERE ANY?   _____

    (1) Yes

    (2) No

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APPENDIX III

Survey Results

The coded results of the survey were placed on a 9 track magnetic tape using a recording density of 1600 bpi and a variable-block spanned record format. The data for each questionnaire was stored in binary form as 700 halfword integers. The following gives the correspondence between the questionnaire and the variable indices.

Period 1 results occupied variables 1 to 259. Period 2 were similar to Period 1 and occupied 260 to 518. Period 3 results occupied the remaining variables.

Variable	Question	Variable	Question	Variable	Question
1	1	2	2	3	3
4	4	5	5	6	6
7	7	8	8a	9	8b
10	8c	11	8d	12	8e
13	8f	14	8g	15	8h
16	9a	17	9b	18	9c
19	9d	20	9e	21	9f
22	10a	23	10b	24	10c
25	10d	26	11a	27	11b
28	11c	29	11d	30	12a
31	12b	32	12c	33	12d
34	13a	35	13b	36	13c
37	13d	38	14a	39	14b
40	14c	41	14d	42	15a
43	15b	44	15c	45	15d
46	16a	47	16b	48	17a
49	17b	50	18a	51	18b
52	18c	53	19a	54	19b
55	21a	56	21b	57	21c
58	21d	59	21e	60	22a

Variable	Question	Variable	Question	Variable	Question
61	22b	62	22c	63	22d
64	22e	65	23a	66	23b
67	23c	68	23d	69	23e
70	24a	71	24b	72	24c
73	24d	74	24e	75	24f
76	25	77	26a	78	26b
79	26c	80	26d	81	27a
82	27b	83	27c	84	27d
85	27e	86	28	87	29a(1)
88	29a(2)	89	29a(3)	90	29b(1)
91	29b(2)	92	29b(3)	93	29c(1)
94	29c(2)	95	29c(3)	96	29d(1)
97	29d(2)	98	29d(3)	99	29e(1)
100	29e(2)	101	29e(3)	102	29f(1)
103	29f(2)	104	29f(3)	105	29g(1)
106	29g(2)	107	29g(3)	108	29h(1)
109	29h(2)	110	29h(3)	111	29i(1)
112	29i(2)	113	29i(3)	114	29j(1)
115	29j(2)	116	29j(3)	117	30
118	31	119	32	120	33a
121	33b	122	33c	123	34
124	35	125	36a	126	36b
127	36c	128	37	129	38
130	39	131	40a	132	40b
133	40c	134	41	135	42
136	43	137	44	138	45
139	46	140	47	141	48
142	49	143	50	144	51a
145	51b	146	51c	147	52
148	53	149	54a	150	54b
151	54c	152	54d	153	54e
154	54f	155	54g	156	54h
157	54i	158	54j	159	54k
160	54ℓ	161	54m	162	54n

Variable	Question	Variable	Question	Variable	Question
163	54o	164	55a	165	55b
166	55c	167	55d	168	55e
169	55f	170	56a	171	56b
172	56c	173	56d	174	56e
175	56f	176	57a	177	57b
178	57c	179	57d	180	57e
181	57f	182	58a	183	58b
184	58c	185	58d	186	58e
187	58f	188	58g	189	58h
190	58i	191	58j	192	58k
193	58ℓ	194	58m	195	58n
196	58o	197	58p	198	58q
199	58r	200	59a	201	59b
202	59c	203	59d	204	60
205	61	206	62	207	63
208	64	257	26e	258	26f
259	40d				

Question 20 Woman's activities

The first part represents hours for particular event in the morning, second, hours for event in the afternoon and third, how done with code.
    1. by hand
    2. by machine
    3. other

209-211	obtaining water	212-214	dehulling grinding
215-217	preparation of breakfast	218-220	preparation of lunch
221-223	preparation of dinner	224-226	obtaining wood
227-229	artisan work	230-232	work in fields
233-235	educating children	236-238	self education
239-241	cleaning house	242-244	preparation of seed grain
245-247	sale of products	248-250	visits and leisure
251-253	ceremonies and celebrations	254-256	other

Period 3

Variable	Question	Variable	Question	Variable	Question
519	1	520	2	521	3
522	4	523	5	524	6
525	7	526	8	527	9a
528	9b	529	9c	530	10a
531	10b	532	11	533	12
534	13	535	14a	536	14b
537	14c	538	14d	539	14e
540	14f	541	15a	542	15b
543	15c	544	15d	545	15e
546	15f	547	16a	548	16b
549	16c	550	16d	551	16e
552	17a	553	17b	554	17c
555	17d	556	17e	557	17f
558	17g	559	17h	560	17i
561	17j	562	17k	563	17l
564	17m	565	17n	566	17o
567	17p	568	17q	569	17r
570	17s	571	17t	572	17u
573	17v	574	17w	575	17x
576	17y	577	17z	578	17aa
579	17bb	580	18	581	19
582	20	583	21a	584	21b
585	21c	586	22a	587	22b
588	22c	589	22d	590	22e
591	23	592	24	593	25
594	26	595	27a	596	27b
597	27c	598	27d	599	27e
600	27f	601	27g	602	29
603	30	604	village code (not used)		

Period 3 - Question 28

Sorghum Functional Properties (In order not to lose context in translation, text is left in French)

Variable	Characteristic	Variable	Characteristic
605	Gros Grain	606	Grain Blanc
607	Feuilles Vertes	608	Tige Developpée
609	Tige Bonne	610	Beaucoup de Farine
611	Bout Pointu non Attaque	612	Propre
613	Facile à Piler	614	Gros Epis
615	Epis Lourd	616	Epis Recourbe
617	Epis Luisant	618	Epis Noir
619	Epis Plein de Grains	620	Dur
621	Sec	622	Precoce
623	Productif	624	Autres

Millet Functional Properties

625	Gros Grain	626	Un Peu Vert
627	Un Peu Petit	628	Foncés
629	Vert Foncé	630	Plus Gros Que Le Sanio
631	Pas Beaucoup de Son	632	Jaune Foncé
633	Vert Olive	634	Feuilles Vertes
635	Tige Bonne	636	Tige Developpée
637	Farineuse	638	Haut, Touffu
639	Lourd	640	Epis Long et Plein Mil
641	Dur	642	Sec
643	Precoce	644	Autres

Maize Functional Properties

645	Gros Grain	646	Grains Blanchâtres
647	Grains Blancs	648	Jaunâtres
649	Feuilles Vertes	650	Tige Bonne
651	Tige Developpée	652	Farineux
653	Graines Serrées Aux Epis	654	Orange - Seche
655	Jaune Foncé	656	Bien Mur

Variable	Characteristic	Variable	Characteristic
Maize Functional Properties (cont.)			
657	Epis Plein de Graines	658	Pas D'Espace Entre Les Graines
659	Precoce	660	Autres
Rice Functional Properties			
661	Pas D'Amidon	662	Petit Grain
663	Pas De Dechets	664	Grain Blanc
665	Gerbe Verte	666	Tige Bonne
667	Feuilles Vertes	668	N'Absorbe Pas Trop D'Huile
669	Brise	670	Non Patteux
671	Precoce	672	Grain Long
673	Enveloppe Jaune	674	Autres