CROP PRODUCTION IN NIGER (1973)

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INDEX

		Page
I.	Summary	1
II.	The Sample	2
III.	Summarization	4
IV.	Survey Results	10
V.	Recommendations for Future Surveys	16
	Production of sampling errors	16
	Non-sampling errors	19
	Expediting summarization of the survey	20
VI.	Future Assistance to Niger	21

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I. SUMMARY

This report covers the summarization of crop area and production portions of an annual sample survey of agricultural households in Niger. This summarization was sponsored by the United States Agency for International Development (USAID) with the intention of obtaining the more timely and reliable statistics of cereal grain production needed in the administration of the drought-relief program in that part of the Sahel. Most of the work was done in Washington, D.C., using the USAID computer facilities there. However, the project did include two trips to Niger. The first trip, November 3-10, 1973, was primarily to pick up the collected survey data. The purpose of the second trip, February 13-15, 1974, was to deliver preliminary results of the tabulation, to evaluate any apparent discrepancies in the tabulation, and to discuss a proposal by the statistical office in Niger for continued assistance.

The production of millet and sorghum in Niger in 1973 is estimated at 630,000 metric tons. This estimate was obtained from survey data collected in Niger in 1973 and summarized in Washington, D.C. The standard error of this estimate is 40,600 tons. The estimated production published by Niger for 1972 was 1,127,000 tons. Descriptions of the survey and of the summarization procedures and evaluation of the survey results, suggested changes in survey procedures for future surveys, and recommendations for future assistance are contained in following sections of this report.

II. THE SAMPLE

The 1973 annual Crop Production Survey in Niger was intended to obtain acreage and yield information from a sample of villages throughout the cultivatable portion of Niger. The survey design called for a total sample size of 360 villages. A subsample of 670 exploitant households was to be selected from these villages.

The plan of sample selection was as follows. The cultivatable area of the country is divided into 120 administrative districts. Each district was to be divided into thirds, north to south, and one village was to be selected from each third. This north-to-south stratification was used to reduce the effects of expected lesser rainfall in the northern parts of the districts. Each of the selected villages was to be enumerated after the crops had been seeded. This enumeration supplied a list of households (exploitations) having one or more fields planted to some crop. A random sample of two households was then selected from each sample village.

All fields belonging to the selected exploitations were then to be measured. Sample plots (one per field) were also to be randomly located in the fields. The number of plants of each crop planted in the sample plot was also recorded. As the crops matured, the enumerators (local agents of the Ministry of Agriculture) were to return to the fields, count the number of productive plants (stems) in the sample plots, harvest the crop from the sample plot and weigh it. Grains were to be weighed both in the head and after threshing. Peanuts (arachide) were to be weighed only in the shell.

Field measurements consisted of measuring the lengths and compass headings of the consecutive sides of the fields. A scale drawing of the field was to have been constructed on a planchette in the local office. This drawing had two uses. First, it would show if any major errors in measurement had occurred. Second, it could be used to obtain a measure of the area in the field.

The actual survey included a total of 598 exploitations in 303 villages from 105 districts. The preliminary enumeration of the selected villages generally appeared to have been completed in a satisfactory manner. The field measurements received by me were quite variable in quality. Some appeared to be quite good. Others either had been done carelessly or else the figures had been miscopied at some point along the line.

The yield information received was also quite variable in quality. Some agents provided detailed weights and comments about the crop(s). Others apparently rounded off the weights to the nearest kilo, causing a suspicion that they did not really weigh the production from the sample plot. There were also a large number of fields where no indication of production was obtained. This was especially true of sorghum and niebe grown in association with millet. The yield information was obtained for millet but not for the other crops. In some cases, the form indicated that the field had already been harvested by the exploitant before the agent returned. In other cases, either the agent had not returned to get the yield information or the crop was not yet ripe when it was time to send the survey forms to Niamey.

III. SUMMARIZATION

The summarization procedure used direct-expansion estimates adjusted for incompleteness at different levels. The validity of this procedure relies upon the validity of the following aasumptions:

1. That the selected villages are an equal-probability sample of villages in their district.
2. That the procedures for selecting exploitants in the selected vilaages were carried out according to instructions.
3. That all fields belonging to the selected exploitants were enumerated.
4. That procedure for locating sample plots in the selected fields was equivalent to equal-probability random sampling.
5. That yields from fields where the production information was not obtained represent random deletions from a larger population of all the fields that produced that crop.
6. That villages in districts not included in the survey represent random deletions from the total list of villages in that particular arrondissement.

The survey was summarized on an IBM 360-65 computer operated by A.I.D. in Washington, D.C. The following Fortran G programs were written for this tabulation. (The two numbers enclosed in the parentheses immediately after the program name describe the size of the program, first in the number of Fortran statements, second in thousands of bytes of core required, including supervisor-supplied subroutines.)

Program Name	Function
HEC (118,28K)	Computes the area of an irregular polygon from measurements taken around the perimeter.

If distances are measured in meters, area of field will be in hectares. Also, computes the error in closure of the figure and prints a warning message if the error exceeds a certain limit.

UPDATE (49, 23K) — Inserts, replaces, or deletes specified 80 character records in a sequential file. The first 16 characters of each record are specified as control characters.

FW4 (112, 27K) — Processes data from the "Rendement" survey forms, assigns codes to indicate if crops are grown in pure stands or in association (mixed with other crops), and reformats the data into the form required by the summarization program.

FW2 (87, 25K) — Sequence edit tests combined data files to check for missing data records.

NCS (277, 35K) — Expands survey data to estimates at the district and higher administrative levels. Includes adjustments for missing yield information and for districts that were not included in the survey. Printed output for village and higher-level estimates can be suppressed as desired. Optional output tables include:

a. only totals for each crop
b. crops estimated by pure and associated stands
c. by special combinations of crops grown in association.

Sampling errors are computed at the district and higher levels.

The survey data received from Niger were not transferred directly to punched cards for two reasons:

1. The survey forms used for the survey were not designed for key-punching. In fact, there was not even a single standard version of each form.
2. Numeric characters used were European rather than American style. I felt that American keypunchers probably would not interpret many of the characters properly.

Consequently, all data to be used in the summarization was hand-copied from the survey forms to listing sheets before it was keypunched. This operation required about 100 man-hours.

When the field measurements were processed by program HEC, the initial output indicated probably substantial errors in the data for more than a third of the fields. To evaluate and correct these possible errors required more than 200 additional man-hours.

The errors had many sources. A relatively small number occurred in keypunching the data. Also, a number of copying errors were introduced when the data were transferred from the survey forms. However, the major portion of the errors were in the data from the survey. Where scale drawings of the individual fields were available, I found that the errors generally fell into one of the three following categories:

1. At some point on the perimeter, the compass headings would become in error by 90 degrees.
2. A compass heading of 300 to 360 degrees would be recorded as 200 to 260 degrees - always 100 degrees less, e.g., "234" for "334".

3. If the scale of the drawing was 1:2000, the reported length of the last side would often be almost exactly half as long as it would have to be to close the figure.

It appeared that all three error categories were copying errors, implying that the original field measurements had been transcribed at least once before I received the data. The first and third types of error could have occurred if a scale drawing had been made of the fields, and then a new survey constructed from the sketches. If the north orientation of the field was lost during this process, some of the angles would have been in error in the amount of 90 degrees. Also, if the drawing was to a scale of 1:2000, the conversion from millimeters on the drawing to meters in the field would have been multiplied by 2. Failure to do this would result in a distance only half as long as it should be.

For fields where the scale drawings were not available, it was necessary to assume that at least one of these types of copying error had occurred, and by a method of trial and error, attempt to find a combination that would cause the figure to close.

The final edit run, to determine that there was a "Rendement" form for every field, and that there was a set of field measurements for every "Rendement" form, revealed that the yield and production forms had not been received for 144 of the 1,774 fields in the survey. The crops grown in those fields could be determined from the field measurement forms. Therefore, on the assumption that the fields probably would be (or had been) harvested, records were constructed to credit those crops with areas seeded and harvested.

The summary program (NCS) computed separate sums for each crop grown by the sampled households in each village. The particular sums cumulated

for each crop were area planted, area harvested, comparable totals of production and area harvested, and the number of fields that went into each total. The grand totals for each village were divided by the number of sampled households and multiplied by the total number of agricultural households in the village to get estimates for the village. The village estimate was multiplied again by the total number of agricultural villages in the district to give an estimate for the district. The individual village estimates for the district were then averaged over the villages to obtain the final estimate for the district. Between-villages variances were also computed to provide standard errors of the district estimates.

District averages, variances, and item counts were cumulated within arrondissements. These cumulations were then adjusted for any districts in the arrondissement that had not been included in the survey to give estimates for the arrondissements. (The adjustment factors used are given in Table 1.) Estimates for the arrondissement were then summed to obtain totals and variances, first for departments, and then for the nation.

The estimated production at each level of summarization was computed by multiplying a derived yield by the estimated area harvested. The derived yield was obtained from the comparable totals of area and production from the next lowest level.

Table 1 - Adjustment Factors (1973 Niger Crop Production Survey)

Department	Arrondissement	Factor
Niamey	Tera	2.049
	Ouallam	2.469
	Tillabery	1.000
	Say	1.270
	Filingue	1.236
	Niamey	1.692
Dosso	Dosso	1.046
	Loga	5.000
	Birni-Ngaoure	2.054
	Doutchi	1.617
	Gaya	1.101
Tahoua	Keita	1.000
	Komi	1.000
	Bouza	1.000
	Illela	3.000
	Madaoua	1.248
	Tahoua	2.953
Maradi	Dakoro	1.132
	Mayaki	1.000
	Tessaoua	1.000
	Aguie	1.000
	Guidon Roumdji	6.218
	Madaroumea	1.893
Zinder	Goure	1.000
	Tanout	1.000
	Mirriah	1.000
	Matameye	1.000
	Magaria	1.000
Diffa	Maine-Soroa	1.000
	Diffa	1.307

IV. SURVEY RESULTS

The survey indicates that 630,230 metric tons of millet and sorghum were produced in Niger in 1973 (Table 2). The standard error of this estimate was 40,590 metric tons. This would imply that two out of three similar surveys would have produced estimates between 589,000 and 671,000 tons, or nineteen out of twenty similar surveys would have produced estimates between 549,000 and 711,000 metric tons. Therefore, unless nonsampling errors had introduced gross downward biases in the survey results, the production of cereals in Niger in 1973 was only about half as much as a "normal" crop, and at least 416,000 tons below the official estimate for 1972 of 1,127,000 tons.

One way to assess the possibility of major nonsampling errors would be to compare the survey estimates of total area harvested for any crop, the area harvested for millet, and the yield of millet with the latest year for which official estimates are available (Table 3). The average yield, by departments, of millet from the survey was generally at a much lower level than the official estimates for 1972. Also, there are major differences in acreage for two of the six departments, Niamey and Zinder, and a lesser but still significant difference for the department of Tahoua.

Table 2 - Estimated areas [1/] planted and harvested, production and average yields of principal crops, with standard errors (Niger, 1973)

Crop	Area		Production	Yield
	Planted	Harvested		
	(000) Ha	(000) Ha	(000) Tons	Kg/Ha
Millet - Est.	2,263.7	2,104.0	571.71	271.7
S.E.	155.1	152.0	38.9	3/
Sorgo - Est.	770.6	427.6	58.52	136.9
S.E.	79.7	51.4	11.6	3/
Total Millet and Sorgo - Est.	2,408.9 [2/]	2,214.1 [2/]	630.23 [4/]	284.3
S.E.	160.4	157.5	40.59	3/
Niebe - Est.	1,156.8	653.3	34.17	52.3
S.E.	112.1	93.1	6.3	3/
Arachide-Est.	195.8	165.3	51.91	314.1
S.E.	25.2	21.1	9.2	3/

1/ Area estimated for individual crops will include fields where other crops are intermixed. Therefore, there is some double and triple counting of cultivated areas.

2/ Total is less than sum of components as most sorgo is grown in association with millet.

3/ Not computed.

4/ 1972 production of millet and sorgo was 1,127,000 tons. Source: "Rapport Annuel, Tome II, Statistiques, Année 1972" (Ministère de l'Economie Rurale, Direction de l'Agriculture, Republique du Niger).

Table 3 - Total area harvested, area harvested for millet, and yield of millet by departments (Niger 1972 1/ and 1973 2/).

Department	Total area harvested		Area in millet		Yield of millet	
	1972	1973	1972	1973	1972	1973
	(000) Ha	(000) Ha	(000) Ha	(000) Ha	Kg/Ha	Kg/Ha
Niamey	1,021	410	995	405	438	305
Dosso	402 3/	489	430 3/	465	550	282
Tahoua	380	201	258	188	256	266
Maradi	424	370	297	209	345	232
Zinder	434	815	376	717	421	263
Diffa	16	20	14	20	333	335
Total	2,677	2,304	2,370	2.104	390	272

1/ Source: "Rapport Annuel, Tome II, Statistiques, Année 72" (Ministère de l'Economie Rurale, Direction de l'Agriculture, Republique du Niger).

2/ Source: 1973 Niger Annual Crop Survey.

3/ Area harvested for millet is impossibly larger than total area harvested for all crops!

Table 4 - Area under cultivation by exploitation, 1973 estimate and 1973 annual crop survey, by departments (Niger).

Department	Villages	Survey Est. Exploitants		Area in cultivation (Has)			
		Per village	Total	Total area		Area/exploitant	
				1972 1/	1973	1972	1973
	No.	No.	No.	(000) Ha	(000) Ha	Ha	Ha
Niamey	1,115	48.98	34,610	1,021	435	18.7	8.0
Dosso	1,191	53.01	63,132	402	495	6.4	7.8
Tahoua	870	77.97	68,836	380	256	5.6	3.8
Maradi	1,990	31.78	63,233	424	397	6.7	6.3
Zinder	2,581	45.68	117,901	434	904	3.7	7.7
Diffa	470	35.99	16,820	16	20	1.0	1.2
Total	8,217	46.80	384,532	2,677	2,304	7.0	6.0

1/ Source: "Rapport Annuel, Tome II, Statistiques, Année 72" (Ministére de l'Economie Rurale, Direction de l'Agriculture, Republique du Niger).

Of the two components of production, area and yield per unit area, the yield component is by far the most volatile and is capable of large changes from one year to the next. Insofar as the direction of the change in yields is concerned, I did not understand that Mr. Illo Katche, head of the statistical service in Niger, was concerned about the level of the average yields indicated by the 1973 survey. Also, Mr. Ian Pattinson of the OPVN in Niamey had previously expressed his opinion that the 1973 crop of millet and sorghum was poorer than that in 1972.

The differences in the estimated areas under cultivation in the departments of Niamey, Tahoua, and Zinder are so large that at least one of the two sets of figures is grossly in error.

If the official 1972 estimates for Niamey are correct, then

1. the average village selected for the survey was less than half as large as the average village in the department, or
2. the enumerators listed less than half of the exploitants in the sample villages, or
3. the enumerators selected exploitants whose holdings were less than half as large as the average for their villages.

Considering that the survey average size of holding in Niamey was already the largest of any department, the latter possibility seems unlikely. Also, except for Tahoua, the survey average number of exploitants per village in Niamey is almost as large as that of any other department.

The reduced area under cultivation in Tahoua comes entirely from the relatively small area cultivated per exploitant. Among possible reasons for the relatively small area under cultivation are:

1. The enumerators did not measure all the fields.
2. The land is so fertile that they don't ordinarily need large holdings.
3. The season was so dry that many of the marginal fields were not even planted.
4. There wasn't enough seed.

The situation in Zinder seems to be exactly the opposite of that in Niamey. In Zinder, if the 1973 survey is wrong and the 1972 estimates are right, then

1. The sample villages selected were at least twice as large as the average village in the department of Zinder, or
2. The average area under cultivation in Zinder is less than half as much as elsewhere in Niger, implying that the enumerators selected much larger than average-size exploitations for the sample.

The 1972 annual report indicates that 80,000 hectares were cultivated in Diffa in 1971, but only 15,000 hectares in 1972. A footnote indicates that the reduction in 1972 was because of extreme drought conditions.

V. RECOMMENDATIONS FOR FUTURE SURVEYS

The following recommendations are divided into three groups according to the principal purpose of the recommendation. These purposes are:

1. Reduction of sampling errors
2. Reduction of nonsampling errors
3. Expediting the summarization of the survey

Reduction of sampling errors

Changes in sampling procedures which should materially reduce the sampling errors of the survey estimates are:

1. (a) Selecting sample villages with probabilities proportionate to the size of the village, or
   (b) if villages continue to be selected with equal probabilities, selecting a variable number of households per village, depending on the size of the village.
2. Replacing only one third of the sample exploitations each year, thus enabling use of the remaining two thirds to construct a ratio estimate of the year-to-year changes.

The rationale for the first two options can be demonstrated mathematically as follows:

Let m_i be the number of sampled households in the ith village,

M_i be the total number of households in the ith village,

$\hat{M}_i$ be the best *a priori* estimate of M_i,

N be the total number of villages in the region,

n be the number of villages in the sample,

x_{ij} be the value observed for some item, X, in the jth household in the ith village, and

Y_{ij} is the expansion factor used in converting the x_{ij}'s to estimates of X for the region.

With a two-stage sample as is used in this survey, the expansion factor, Y_{ij}, for the jth household in the ith village is the product of the reciprocals of the joint probabilities: a, that the ith village was selected, and b, that the jth household in that village was also selected. If both stages of sampling are with equal probabilities (as in the past), then $Y_{ij} = \frac{N}{n} \cdot \frac{M_i}{\bar{m}_i}$, and the estimate of X for the region is computed as $X = \sum_{ij} (Y_{ij} x_{ij})$.

Examining the components of Y_{ij} we find that N and n are constants over a given region. Furthermore, in this survey, m_i is almost always constant. However, M_i has the properties of a random variable in that its value will depend only upon the village with which it is associated. Therefore, Y_{ij} is a function of M_i and is also a random variable. For the purpose of this paper, I shall also assume that Y_{ij} is independent of X_{ij}. Therefore, X is the sum of the products of two random variables, hence the variance of X, S_X^2, will be the sum of the variances of the products of x_{ij} and Y_{ij}, with i = 1 to n, and j = 1 to m_i. That is,

$$S_X^2 = \bar{x}_{ij}^2 \cdot S_{Y_{ij}}^2 + \bar{Y}_{ij}^2 \cdot S_{x_{ij}}^2$$

As a numerical example with data from the 1973 survey, where x_{ij} is the area cultivated by the jth household in the ith village:

$\bar{x}_{ij} = 5.37$ $\qquad$ $S_{x_{ij}}^2 = 6.192$

$\bar{Y}_{ij} = 47.54$ $\qquad$ $S_{Y_{ij}}^2 = 549.0$

Then $S_X^2 = (5.37)^2(549) + (47.54)^2(6.192)$

$= 15,831 + 13,994$

From the above we see that, for equal-probability sampling, more than half of the variance of the estimated area under cultivation is a multiple of the variance of the expansion factor.

The variance of the expansion factor can be reduced either by sampling with probabilities proportionate to the households in the village in selecting the villages, or by letting the number of households selected in the village be proportionate to the total number of households in the village. The reduction comes from the different values used in computing the variance of the expansion factor. Under the present system of two-stage equal-probability sampling, $S^2_{Y_{ij}}$ is computed as

$$(1) \quad S^2_{Y_1} = \frac{\sum^{k} (Y_{hi} - \bar{Y})^2}{k-1}$$

With villages selected with probabilities proportionate to some *a priori* estimate of the number of households, $\hat{M}_i$, so that $\hat{Y}_i = \frac{1}{\hat{M}_i}$

$$(2) \quad S^2_{Y_2} = \frac{\sum^{k} (Y_i - \hat{Y}_i)^2}{k-1} \quad \text{and}$$

with villages selected by equal probabilities but with the number of sample households selected in proportion to the total number in the village, it is computed as

$$(3) \quad S^2_{Y_3} = \frac{\sum^{h} \sum^{k_h} (Y_{hi} - \bar{Y}_h)^2}{\sum (k_h - h)}$$

where the possible range of village sizes has been divided into h size groups, each with its own mean, $\bar{Y}_h$.

$S^2_{Y_3}$ will always be less than $S^2_{Y_1}$ if h is greater than 1, but the potential gains for a given average number of households per village will be less than for $S^2_{Y_2}$. If the *a priori* estimates, $\hat{M}_i$, are very good, i.e., if there is a high positive correlation between Y_i and $\hat{Y}_i$, then $S^2_{Y_2}$ can become very

small with respect to S_x^2. However, if the a priori estimates of Y_i are not good, so that the correlation between Y_i and $\hat{Y}_i$ is negative, then $S_{Y_2}^2$ will be larger than $S_{Y_1}^2$. The choice between the two procedures possibly would depend upon one's expected ability to obtain good a priori estimates, $\hat{M}$, of the number of households in each village.

The optimum number of exploitations to be selected from each sample village for estimating the area of land under cultivation is estimated as 2.1. This estimate is derived from variance components computed from the survey data. The relative costs of (a) enumerating the sample village in preparation for selecting the sample households, and (b) measuring the fields and estimating the production from them were not considered in deriving this estimate.

The estimated average number of exploitations per village was 47.5. Therefore, if the number of sample exploitations selected per village was to vary in proportion to the total number of exploitations in the village, only 1 exploitation would be selected from villages having less than 34 exploitations, two would be selected from villages having from 34 to 56 exploitations, three would be selected from villages of 57 to 79, four from villages of 80 to 101, etc.

Nonsampling errors

The effect of possible nonsampling errors in the survey could be reduced by the following methods:

1. If there are not enough personnel available to survey all the districts in an arrondissement, then the sample should be drawn from the arrondissement as a whole, and not from a portion of the districts. Enumerators should then be shifted to wherever the sample villages might fall. The estimates for individual districts may not be as good, but the estimates for the arrondissement will

be better.

2. Tighter control at the departmental and arrondissement levels of administration, with respect to both scheduling of survey work and keeping a detailed record of what work has been done and what work remains to be done (and when it should be done). Particular attention should be given to

   a) detecting and correcting errors in field measurements;

   b) getting the agents to return to the field to complete the "Rendement" form; and

   c) having the supervisors conduct quality checks on the enumerators' work to verify that the agents are really doing what they are supposed to do.

3. Additional training of the agents used in the survey.

A test for possible large-scale nonsampling errors in the 1973 survey could be made by using in 1974 half of the same exploitations used in the 1973 survey. The 1974 data from the 1973 sample could be compared with that from the new sample to determine if there was a significant difference. If there was, and the data from the new 1974 sample was considered correct, the 1973-to-1974 changes from the remaining half of the 1973 sample could be used to revise the estimates for 1973.

Expediting summarization of the survey

1. I did not explore this matter directly, but I had the impression that the postal service was not used in transmitting data to and from the office in the country. Are there particular reasons why not, and can they be overcome?

2. If the field measurement forms are checked and sent to Niamey as they are completed, preliminary estimates of the amount of area planted to

different crops could be made before the crops are harvested.

3. Where different groups of crops are harvested at different times, the "Rendement" forms for early-maturing crops could be checked and sent to Niamey for processing before the forms for the later-maturing crops.

4. A single standard set of survey forms and survey progress-record sheets should be used throughout the country. Furthermore, the forms should be redesigned in such a way that, when a computer becomes available, the data can easily be transferred to punched cards.

5. Particularly, if a ratio-to-last-year type of estimate is to be used, consideration should be given to using a computer.

VI. FUTURE ASSISTANCE TO NIGER

On my last visit to Niger (February 13-15) I had the opportunity of reviewing a preliminary draft of a request for U.S. assistance in improving the abilities of the statistical office in the Bureau of Rural Economics in Niger. This request was principally for materials, additional personnel, and transportation.

The materials requested were primarily those that would be needed in conducting crops surveys and in summarizing the results. Specific items listed that would be needed in conducting surveys were measuring tapes, compasses, scales, planchettes, and a mimeograph. Equipment needed for summarization would include desk calculators.

The proposal called for hiring 36 additional full-time personnel. These would be organized into 6 crews - one for each department. Each crew would have a supervisor, 5 enumerators, and a vehicle. Presumably these special crews would be used to survey areas where no other agents were

available, or to conduct special surveys.

The proposal also calls for the purchase of several vehicles and an allowance for gasoline and maintenance.

I would not argue that any of the items listed in that request are not needed. However, I am concerned about two notable classes of items that were not in the original request.

First, the proposal did not provide any indication as to how the requested items would help to improve their statistical program, nor was anything said about organization of a long-term program for the development of a statistical capability. Second, there is no request for technical assistance. It is my judgment that they could use some short-term assistance in systematic sampling with probabilities proportionate to the size of the primary sampling units, and in setting up the summarization system for the probability surveys. This would be particularly true if they began using a ratio estimate for computing year-to-year changes. I also suggest some in-country training courses as well as on-the-job training programs for the development of existing and new staff.

The statistical office in Niger has no immediate plans to computerize any of the survey tabulation. At present, if they were to do so, they would have to go to Ouagadougou, Upper Volta, or to Abidjan, Ivory Coast to find a computer. At least one of the programs (HEC) used in summarizing the 1973 data could be put up on the IBM 360-25 computer at Ouagadougou with very little trouble. The other programs could be adapted with 2 or 3 weeks of work. Aside from that, if the crop surveys in Niger were to be computerized, they could also use help both in redesigning survey forms to facilitate keypunching and in setting up the additional computer programs that would be required for ratio estimates or for other types of data.

A possible program of technical assistance could include the following, and could be coordinated with assistance in Upper Volta:

1. June 1974 - 1 sampling statistician and 1 programmer statistician for 3 weeks in Niger to assist with sample selection and plans for tabulation of the survey results.
2. October-November 1974 - 1 sampling statistician and 1 programmer statistician for 4 weeks in Niger, to
   a) evaluate summarization of the field-acreage data,
   b) observe the collection of the yield information for different crops in different parts of the country, and
   c) assist with final plans for summarizing the yield and production information.
3. March 1975 - 1 sampling statistician and 1 programmer statistician, for 3 weeks in Niger, to review experience of the 1974 survey and work out possible refinements for 1975 and future surveys.
4. May 1975 - Same technicians for 4 weeks in Niger to assist in the conduct of an in-country training program for the development of permanent staff. This course would be designed to review elementary statistics and develop the basic concepts of sampling applications to agricultural data systems.
5. If the recommended technical assistance is requested from the SRS, it is suggested that an additional 2 man-months be included in the program for preparation and other work that would have to be done in Washington.