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9. ABSTRACT

Guatemala, like many developing countries, has a large and growing rural population and a limited arable land base. Farmers live in conditions of exteme poverty, suffer high unemployment rates and have low food production levels. Over the last decade a variety of programs including credit, research, and extension have been undertaken to improve the rural situation. This study is an attempt to evaluate the impact of these programs on the three most important objectives for the Guatemalan agricultural sector. These are:

- Increasing food production
- Increasing small farmer net incomes (the "equity" objective)
- Increasing rural employment

The analysis is based on data gathered by the Government of Guatemala from 1600 farms in 1974. Half of the sampled farms had been receiving institutional production credit (BANDESA) and technical assistance. The other half were selected as a control group of farms with similar size, endowment, and locational characteristics, but without institutional credit.

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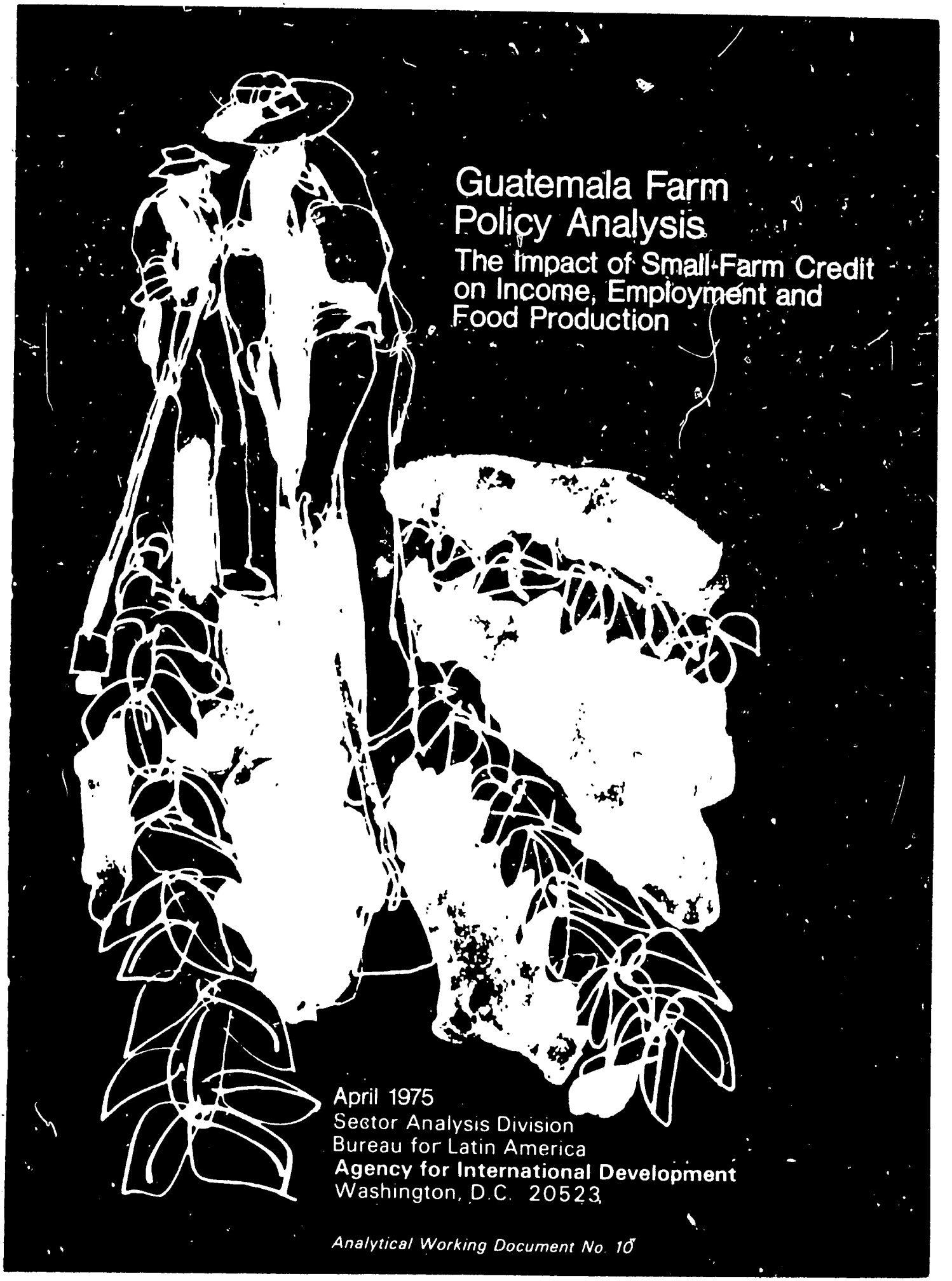

Guatemala Farm Policy Analysis

The Impact of Small-Farm Credit on Income, Employment and Food Production

April 1975
Sector Analysis Division
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Agency for International Development
Washington, D.C. 20523

Analytical Working Document No. 10

GUATEMALA FARM POLICY ANALYSIS

April 1975

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This study is based upon a farm-level survey of 1600 farms in Guatemala. Many people were involved in the several phases of the data collection and processing effort associated with the survey. Several Agencies of the Guatemalan Government as well as the AID Mission were very helpful in providing interviewers and related support for the sampling in the field. The following people and institutions were particularly helpful in the indicated phases of the project although there were others who contributed also.

The collaboration of Alfredo Gil Spillari, Director General of the Dirección General de Servicios Agrícolas (DIGESA) and Gert Rosenthal, who was Secretary of the Consejo Nacional de Planificación Económica (CNPE) during the time the survey was conceived and carried out, made the survey a successful endeavor. The Banco Nacional de Desarrollo (BANDESA), the Centro Técnico Forestal (CETEFOR), the Instituto de Ciencia y Tecnología Agrícolas (ICTA) and the Instituto Nacional de Comercialización Agrícola (INDECA) also made personnel and other facilities available for the survey. Luis del Valle of the CNPE provided the administrative and coordination services. Rodolfo Estrada of the CNPE supervised the selection of interviewers and coders, selected the subsample of farmers included in the survey and assisted in establishing the limits for the machine edit process in Washington, D.C. Jerry Wein of U.S. A.I.D. and Robert Bravo of the Rural Development Office provided coordination and back-stopping assistance.

Joint A.I.D. and Government of Guatemala plans for a sample survey to serve as the basic data for the analysis began in November and December of 1973. Floyd O'Quinn from the Bureau of the Census assisted the Guatemalans in designing the sample and in refining the Colombia survey forms for use in Guatemala. This revision turned out to be a rather comprehensive restructuring and produced a questionnaire which should serve for similar analyses in other countries, with only minor modifications. Thyrele Robertson of the USDA was the chief engineer of the sample and has guided its editing. Dr. Robertson also provided valuable criticism of material in early drafts of this report. Herbert Hinman of the USDA was responsible for supervising the editing of the survey forms and producing a final farm-level statistical file. That task turned out to be particularly difficult and Dr. Hinman's tenacity in following through is appreciated. The USDA and Bureau of the Census Sector Analysis groups, under contract to the Sector Analysis Division, Office of Development Resources of the Latin American Bureau in A.I.D., have been the principal implementing agents in the analysis. Barbara Naeseth, BUCEN, and Herbert Hinman wrote and operated the programs which generated the tables found in this document. Charles MacDonald, USDA, provided statistical advice and generated a series of hypotheses tests. José Ricardo, BUCEN, played a similar role on the crop technology work. Robert Bartram and Floyd O'Quinn, BUCEN, developed and programmed a series of tables published under a separate cover which outlines the principal characteristics of the sampled farmers. Mr. O'Quinn also wrote Appendix C of this report which provides technical information on the sample design.

Hunt Howell of USDA provided editorial assistance in organizing this report and in rephrasing some of its arguments. He also contributed Appendix B and the associated findings reported in Sections B through E of Chapter 5. Sandra Rowland of USDA contributed the material for Chapter 2 and assisted in the table preparation and editing. David Megill of USDA prepared all the figures as well as assisting with many of the tables. Sara Dziubkiewicz of USDA typed the several draft versions of the report.

CHAPTER ONE: EXECUTIVE SUMMARY

A. POLICY SETTING OF THE ANALYSIS

Guatemala, like many developing countries, has a large and growing rural population and a limited arable land base. Farmers live in conditions of extreme poverty, suffer high unemployment rates and have low food production levels. Over the last decade a variety of programs including credit, research, and extension have been undertaken to improve the rural situation. This study is an attempt to evaluate the impact of these programs on the three most important objectives for the Guatemalan agricultural sector. These are:

- Increasing food production
- Increasing small farmer net incomes (the "equity" objective)
- Increasing rural employment

B. STRENGTHS AND LIMITATIONS OF THE DATA

The analysis is based on data gathered by the Government of Guatemala from 1600 farms in 1974. Half of the sampled farms had been receiving institutional production credit (BANDESA) and technical assistance. The other half were selected as a control group of farms with similar size, endowment, and locational characteristics, but without institutional credit.

A precise identification of the factors which have caused the credit group to behave differently from the control group along with a quantification of the proportionate share of "effect" attributable to each identified "cause" is beyond the reach of this analysis, and perhaps beyond the reach of any such analysis. When we speak, for example, of the impact of credit on farm output we really mean output differences associated with credit use. No claim is made that the factor which is identified in the analysis as a causative factor, is necessary and sufficient to bring about the impact noted.

Not all the conclusions which are presented in the analysis are restricted to the universe from which the sample data were collected. For example, data from the sample are used to draw conclusions on technical assistance and credit demand for *all* small farms in Guatemala. Such conclusions are less reliable than those which deal with institutional credit as represented by the universe of the sample. Furthermore, the reliability of these conclusions cannot be measured from the sample data.

The BANDESA program involves only a very small proportion of all farms in Guatemala and the extent to which impacts observed in the BANDESA universe and the control group are replicable in the universe of all farms, is not fully known. However, the BANDESA and control farms together appear to be a very broadly based group. Given this and the absence of data on all farms, we feel that conclusions about the universe of all farms in the report are based on the best available data. Though proof of replicability will only come when the impacts of increased credit penetration are actually measured, random sampling in prospective credit regions would improve estimates.

The disaggregation of the analysis by farm size within regions has resulted in a very small number of sample observations for some estimates. Conclusions that are based on these estimates are sometimes less reliable than we would like However, it is possible to compute a measure of reliability for each estimate made from the sample data as long as the estimate is used to make inferences about the sample universe. Because of sample size considerations, estimates in the report for the highlands areas are probably more reliable than those for the South Coast regions.

Having outlined the limitations of the analysis it is important to note that the majority of estimates used in the analysis are not affected by these limitations. Also when compared with other available studies, or compared to the analytical basis for current policy judgments on these issues, the data and method used in the analysis and the reliability of its conclusions are almost always superior. Improvements in both data and method should however be an ongoing process.

C. THE IMPACT OF CREDIT ON FOOD PRODUCTION

1. Do the "Equity" and Food Production Objectives Conflict?

The Government of Guatemala and AID have chosen the small farmers as a major focus of their rural program. This assistance has most often been aimed at the equity objective with the intent of improving the lot of the country's most disadvantaged group. It has been suggested that this equity thrust conflicts with the other important goal of increasing food production, since small farmers in Guatemala are most often characterized as "traditional, subsistence", and by implication, inefficient producers. This analysis concludes that the principal cause of the extreme poverty of Guatemalan small farmers is the size of their farm business and *not* the inefficiency of their production processes.

In an attempt to sharpen the conclusion on the assumed conflict between these objectives we might ask the food-production question in the following form:

If we wish to obtain the maximum possible food production for each unit of the scarce and limited resources at our disposal (arable land and capital), where should those resources be directed; to large or small farmers?

The answer derived from this study is that the resources should be directed to the smaller farmers as they use scarce land and capital inputs most efficiently in food production. Thus we conclude that there is no apparent conflict in Guatemala between the "equity" and food production objectives.

2. Production Increases Associated with Credit

The impact of credit on production appears to have been significant in all farm sizes and in all regions. The average increased production on credit farms was 32% over non-credit farms. This average is far less important than the wide differences in the output response of different farm sizes and regions.

a. *Farm Size:* Table 1 indicates the response to credit was dramatically higher among the smaller farm groups with the less than one hectare group more than doubling the value of output.

Adding to the conclusion of the preceding paragraphs that small farmers produce more per scarce resource unit, we conclude that their output response to credit is greater than that of the larger farms.

Table 1.–Credit Impact on Value of Output by Farm Size
- (Percentage Superiority of Credit Over Non-Credit Farms)

0-1 Hectares	147%
1-3 Hectares	37%
3-5 Hectares	20%
5-10 Hectares	12%
10+ Hectares	17%
All Sizes	32%

Source: Table 21

b. *Region and Farm Size:* The national-level findings shown in Table 1 are sharpened when the regional dimension is added. In the three regions where reliable estimates are possible the credit farms in the two smallest farm size-groups are consistently superior to the non credit farms. This relative superiority generally decreases as farm size increases.

Table 2.–Credit Impact on Output by Farm Size and Region (South Coast Excluded)
(Percentage Superiority of Value of Output on Credit Farms)

	Central Highlands	Southeast Highlands	North-east
0-1 Hectares	112%	94%	255%
1-3 Hectares	54%	39%	61%
3-5 Hectares	99%	17%	-3%
5-10 Hectares	-3%	22%	88%
10+ Hectares	-23%	5%	41%

Source: Table 22

3. Sources of Increased Production

a. *Some definitions:* The analysis attempts to identify several factors associated with increased production which in turn may be influenced by credit use. When comparing credit to no-credit farms we will look for differences of three general types:

(1) Differences in Land Use.
(2) Differences in crop composition.
(3) Different crop technologies and/or marketing practices.

In the category of those changes which involve a difference in land use the following factors are considered:

(a) Increased area cultivated through the rental or purchase of additional land (larger farms)

(b) Increased area cultivated through more intensive use of existing land in the farm (dedicating a larger proportion of land to crops, increased double cropping and/or interplanting)

The second category involves shifting crop mix to higher value crops but with no yield increases.

These first two categories of factors contributing to increased production may be thought of as including "technological change". However they involve no improvement in yields or associated crop level technological improvements such as higher levels of modern inputs. Since almost all of the programs aimed at "technological change" or technology transfer have focused on improved crop quality and/or yields, this analysis treats crop yields, price and quality improvements separately and classifies them as "different crop technologies". Under this heading we list two possible sources of increased output:

(a) Increased yields resulting from either increased modern inputs or better practices

(b) Increased prices from better quality or improved marketing.

Either or both of these changes may be strongly influenced by technical assistance programs.

b. *Results at the National Level for All Farms*

Table 3 contains information on the relative importance of each of these sources at the national level. The percentage superiority of credit over non-credit farms in each category is presented by farm-size class and for all farms together. At this "all-farms" level of aggregation it can be seen that the only important contributing factors are increased farm area and intensification of land use. The increased area is largely due to expanded land rental on credit farms as is shown in Appendix C. Intensification of land use is due largely to the credit farmers dedicating a greater proportion of their farms to cropland. Notice that at this overall level crop mix had no impact. In the "different-technologies" category, differences in yields had a slightly negative effect on credit-farm output.

c. *Results at the National Level by Farm Size*

Differences in crop composition are the major "explanatory factor" on the smallest farms. This factor rapidly decreases in importance as farm size increases suggesting that credit is used to finance high value, and often higher-risk crops (vegetables, flowers, etc.) only when the farmer is severely restricted in the amount of land he can till. On larger farms credit is associated with growing similar crops but using the land more intensively than on no-credit farms.

4. Policy Implications of the findings on Differences in Land Use

a. *Strong support found for land distribution by credit financed rental or purchase*

The question of size of farms and its impact on equity and output has captivated much of the attention

Table 3.–Sources of Increased Production on Credit Farms by Farm Size (Percent Superiority in Credit Over Non-Credit Farms)

Farm-Size Class	Superiority in Total Output per Farm	SOURCES OF DIFFERENCE IN OUTPUT				
		Difference in Land Use		Difference in Crop Composition (Higher Value Crops)	Different Technologies	
		Increase in Farm Area	Intensification of Land Use[2]		Increased Yields	Increased Prices (Marketing & Quality Differences)
0-1 Hectares	147%	6%	–8%	154%	–4%	–1%
1-3 Hectares	37	9	10	15	1	2
3-5 Hectares	20	1	15	–8	15	–3
5-10 Hectares	12	3	14	–1	2	–6
10+ Hectares	17	7	18	–1	0	–7
All Farms[1]	32	17	18	0	–3	0

Source: Tables 21 and 25

[1]The percentages for all farms are not simple averages of the Farm-size values. The larger farms receive greater weight in proportion to their size and number.

[2]This may be subdivided into "proportion of area cultivated", "Multiple Cropping" and "Interplanting" effects. See Table 4.

of planners, analysts and social reformers in Latin America. Land reform has most often meant public intervention through expropriation for land distribution to both landless rural workers and small farmers. The conclusions of the analysis bear directly on the land distribution question but only from observing the impact of expanding farm size through the market mechanisms of rental or purchase. If one makes the assumption that the method of transfer (rental or expropriation) is not likely to affect significantly the income and production objectives then the conclusions may be generalized. There are three such conclusions which may be stated about land distribution.

(1) If the distribution results in a net increase in land in smaller farms, then more income, output and employment will result. Farmers tend to use incremental land in ways very similar to their base. Smaller farmers generate more income, output and employment per hectare than do larger farmers.

(2) If the transfer is made via rental or purchase financed by institutional credit the farm size benefit will be supplemented by the superior output efficiency observed among small farms receiving credit compared to those of similar size but without credit.

(3) Even if the land acquisition were to be accomplished by expropriation, the credit related impacts on output and income objectives might still be achieved providing credit were granted to the land reform beneficiaries.

The analysis strongly supports land distribution by credit financed rental or purchase, or by land reform Given the scarcity of arable land, and the strong evidence that smaller farmers, and institutional credit farmers use it more intensively and efficiently from an output point of view, these conclusions are particularly important. It should be remembered that the potential of this alternative, while it may be large is not long run. It is limited by the absolute quantity of arable land in a region. As soon as the uncultivated land is put into production this alternative will have played its role.

It should be noted that these conclusions cannot be generalized to judgments about programs for transferring land to landless workers, since no landless workers were included in the sample and we are without information on how efficient they would be as farmers. This is not a judgment against such programs, but one would have to make the assumption that the landless worker would react similarly to small farmers in order for the conclusions here reported to be extended to these workers.

b. *Credit is instrumental in bringing idle cropland into production*

Land-use intensity is a vital issue in Guatemala given the limited arable land availability and rural population pressure. It has been suggested that almost all arable land in the highlands is under cultivation. The analysis distinguishes between three types of land-use intensity. The first of these is cultivation of a larger

Table 4.–Land-Use Intensity Sources of Increased Output on Credit Farms: National Average by Farm Size (Percentage of output superiority attributable to each source)

			Output Superiority Attributable to sub-components of land use intensification		
Farm-Size Class	Total Output Superiority (Percent)	Output Superiority Attributable to Intensification of Land Use	Increased Proportion Cultivated	Multiple Cropping	Inter-planting
0-1 Hectare	147%	–8%	–6%	2%	–4%
1-3 Hectares	37	10	6	4	0
3-5 Hectares	20	15	9	1	4
5-10 Hectares	12	14	5	5	4
10+ Hectares	17	18	14	–4	8
All Farms	32	18	13	–1	6

Source: Table 25.

proportion of the area in the farm. This may involve clearing land, cultivating natural grass land, or reducing the amount of time that land is idled in rotation. We refer to this aspect of land use intensity as increased proportion of land cultivated. From Table 4 it can be seen that this source of increased intensity is the most important at the national "all-farm" level accounting for 13% out of an overall 18% superiority due to intensification of land use.

The fact that the increased intensity due to "increased-proportion-cultivated" is negative on the smallest (0-1 hectare) farms leads us to believe that credit farmers have reached the limit of their available arable land. This conclusion is not new with this analysis; what is new is that there is a potential for intensification of land use on all farm sizes over one hectare. It is understandable that larger farms would have more of this "idle land" slack and it is encouraging to notice that credit apparently causes them or enables them to cultivate it.

The second source of intensification comes from the multiple cropping of a particular parcel of land in a single year. This involves crops with a short growing season and which can be harvested quickly so that the land may be planted in other crops. Credit appears to have had little impact on this type of intensity on all farms.

The third intensity source, interplanting, appears to be significant on the larger farms. However, on the smallest farms this effect is negative. This decrease in the amount of interplanting appears to be consistent with the changing crop mix on small farms. These farmers switch from interplanted but low-value subsistence grain crops to higher-value but single-planted crops.

Both multiple cropping and interplanting have considerable potential but depend on longer run developments to become widespread. Multiple cropping in most areas depends on irrigation, and new methods must become widely practical for extending the multiple cropping process from the lower value cereals to the higher value crops. Many of the high value crops are permanent tree crops which lend themselves well to interplanting but the practice is not currently widespread in Guatemala.

In summary, the largest potential in the short run for increasing the area cultivated would be to use credit for bringing currently idle land into crop production.

c. *Long-run importance of using credit to help induce shifts in crop composition*

Crop mix differences account for an important part of the output increase only in certain regions and farm sizes. Table 5 presents the impact of crop mix on output in the three regions for which reliable estimates are available.

Though crop mix is only important in some cases it should be observed that these are also the cases where there is the largest output response to credit. Where output increases are more than 50% crop mix is usually the most important source and always an important contributing factor. The crop mix effect is most important on the smallest farms where it accounts for virtually all of the increase.

If we keep in mind that the farmer with less than one hectare has essentially no idle land, that he is already interplanting with low value cereals as much as he can, and that he owns only unirrigated land without significant multiple-cropping possibilities, his only avenues to increased output are increasing yields or changing crop mix.

Table 5.–Crop Mix Contribution to The Output Superiority of Credit Farms

	National Average		Central Highlands		Northeast		Southeast Highlands	
	Total	Crop Mix	Total	Crop Mix	Total	Crop Mix	Total	Crop Mix
0-1 Ha.	147%	154%	112%	108%	255%	275%	94%	71%
1-3 Ha.	37	15	54	29	61	43	39	–9
3-5 Ha.	20	–8	99	34	–3	–15	17	–6
5-10 Ha.	12	–1	–3	–5	88	63	22	–4
10+ Ha.	17	–1	–23	–7	41	13	5	3
All Farms	32	0	32	11	58	9	15	–8

Source: Table 23

(1) Income output and employment potential of changes in crop mix.

Since the other principal sources of change are unavailable to the smallest farmer it is worth outlining the comparative potential of a program to improve yields and one to change crop mix. The crop-mix change may take place without introducing a new crop but simply by shifting the proportions of area among crops already grown in the farm. For example a farmer may expand his tomato and reduce his wheat acreage. This appears to be the principal kind of crop mix alteration observed. The analysis presents in Table 20 the income and output potential of a wide variety of crops from which it can be deduced that for the less-than-one-hectare farmer (and perhaps for the 1-3 ha. farmer as well) shifting to known high-value crops at current yields will produce two to three times the income than would be achieved with even the best possible yields in the low-value cereals. Causation in changing crop mix is difficult to establish with the data available. However, we can say that the higher value crops require significantly larger amounts of circulating capital. Therefore credit is a necessary but not sufficient condition for cultivating higher value crops.

The narrow focus on cereals by the majority of non-credit small farmers in the highlands areas is one of the principal problems identified by the analysis. Altering crop mix allows for wide alteration in factor proportions. This is because there tends to be a greater difference in factor proportion between crops than between different technologies for a given crop. It is no coincidence that Taiwan with abundant labor but scarce land and capital has achieved dramatic rural development with a mix of crops whose factor requirements match closely Taiwan's proportions of factor endowment. The U.S. with abundant land and capital but scarce labor has focused on cereals and livestock. A large part of the Guatemala rural dilema may be explained by the fact that while its factor proportions resemble Taiwan its crop mix resembles the U.S. or Australia.

Having noted that the expansion of area cultivated has limited long-run potential, that crop mix is the most important long-run hope for the Guatemalan small farmer, and that credit is a necessary but perhaps insufficient condition for widespread changes in crop mix, it is important to outline possible additional limiting factors.

(2) Need for Marketing and Crop-Demand Studies

Unfortunately the discussion at this point leaves the analytical terrain where the report can provide any concrete guidance beyond suggesting areas for further analysis and program experimentation. The reason for this is that the most important potential limiting factors which inhibit widespread crop-mix shifts to high value crops are outside the farm subsector, in marketing and demand.

Demand is an important potential limiting factor because very few of the higher value crops are individually large items in the average low-income diet. As a group they provide more of the world's nutrients than do the cereals but no single one of them is very large. They tend to be products consumed in urban areas and in developed markets. They tend to have high income elasticities of demand which implies that as income rises they become more important. Since the size of the urban and high-income markets in Guatemala are relatively small, large portions of the farmers could not find markets for their products if they shifted, unless the demand in the large urban and high income markets of the developed world could be tapped. Demand for these products (both internal and external) needs to be studied so that the crop-mix shifts could proceed in the directions of most significant long run demand. Because of the heavy labor component inherent in these products, whether produced in California or Guatemala, the long-run comparative advantage of a low-wage-rate country should be good. On the other hand Guatemala could never hope to be able to compete internationally in cereals.

Larger than the problem of the existence of effective demand is the problem of accessing that demand with adequate marketing and processing systems. Most of the high value crops are highly perishable. This sensitivity makes it particularly difficult for an individual farmer to start growing such a crop unless the processing or marketing capacity already exists. For most of these crops some sort of processing (even if it is just selection and packing) is required in addition to normal marketing and transportation functions. Where large crop-mix shifts have taken place it is usually easy to trace these shifts to the prior installation of a processing or packing facility. This is the case with tomatoes in Guatemala. Though the analysis contains no data which would strongly support the suggestion, we posit that the small farmers would be able

to produce the higher value crops with the infusion of credit, but that processing capacity would also have to be in place before such a shift were made. In addition, the marketing problems of identifying and successfully entering international markets for these products should not be underestimated.

In conclusion both the processing and internal/export marketing of high value crops are activities which if not developed will restrict the income, output and employment growth potential of small farmers even more than lack of credit availability. Significant public intervention to analyze, finance and bear the development costs of these activities associated with crop-mix shifts should be seriously explored.

5. Policy Implications of the Findings on Yields

The yields associated with credit for all farm sizes and regions contributed -3% to the credit farm production superiority. This implies that while credit farms increased their production significantly, on the average their yields (output per hectare cultivated) were slightly poorer than the no-credit farms.

A careful review of Table 23 in Chapter 5 reveals a number of important exceptions to this general rule, but yields are never the principal contributing factor to a significant production increase outside the South Coast. This should not be taken to mean that yield increases cannot be achieved.

The exceptions indicate that in pockets yield increases have occurred. The possibility that both control and sample group have yields which may be higher than regional averages leads us to be cautious about the yield findings. What can be said is that credit by and large has not been a significant yield increasing factor and that even where yield increases are sig.ificant they are less important than one of the other factors.

Though yields appear not to have been important, it might be suggested that Guatemala should improve research and technical assistance so that yields will rise in the future. This may be a wise strategy, however the analysis is only able to draw conclusions about future program directions from historical evidence of success. Little information can be obtained from the sample about possible modifications in research directed at improving yields.

From the discussion on yields and modern input packages it might be inferred that a program direction consistent with these conclusions would have a low profile for financing fertilizer, improved seeds, pesticides, and a decreased emphasis on research and technical assistance. This should definitely not be the case. Both the expansion of cultivated area and changes in crop mix would require massive amounts of "modern inputs". The fertilizer, seed and chemicals cost of the higher value crops are much more per hectare than would be required even if a yield increasing package for corn on the same area were to be the program focus. Both research and technical assistance personnel would not necessarily be decreased in number but simply redirected to concentrate on encouraging farmers to increase their cultivated areas and to shift to higher value crops. In addition, the technical assistance and research would concentrate on marketing and processing problems rather than assuming a lowered profile.

6. Technical Assistance and Food Production

Technical assistance is difficult to define and segment in a way that allows careful measurement of its impact. It is difficult to assess therefore, how technical assistance enters the production process and to measure its influences from this sample. It appears that the overall output per hectare cultivated does not increase when technical assistance is provided or as the number of visits from technical personnel increases (see table 97). The total production does, however, increase. This leads us to the tentative conclusion that the assistance has had a significant food production impact but not in the way that the impact was intended. It appears that the major impact is on a more intensive use of the land in the farm and not on yield increases. This more intensive use of the land may result from either increased area cultivated or shifted crop mix. A further study of this process, based on the sample, is underway and should shed additional light.

Supervised credit has long been thought of as a way of linking technical assistance and credit, based on the assumption that each would be made more efficient by the link. This makes considerable intuitive sense. Comparing farms with similar levels of technical assistance, with and without credit provides a rough test of that assumption. When sorted in this fashion the credit and no-credit groups each improve production significantly with added assistance. However, compared to each other it appears that the link of the credit with the technical assistance provides no additional advantage (see table 98). The sample sizes for this conclusion are very small and this conclusion should not be used for program design, but it raises an important question about the necessity for the credit/extension link which ought to be studied further. Since the availability of technical assistance personnel in countries like Guatemala may be in serious short supply, rigid tying of credit to technical assistance might be reexamined and perhaps credit should be "untied" on an experimental basis to measure impact more carefully.

7. The World Food Production Problem and the Guatemalan Small Farmer

The study makes a series of international comparisons of the characteristics and performance of the Guatemalan small farmer in order to orient discussion of food production and efficiency. Food production has become an important international problem and the potential of the underdeveloped world has been often mentioned in both positive and negative terms.

Among the most important conclusions of this comparison are the following:

a. *Capital Intensity:* Contrary to what is often thought, the Guatemalan small farmer has two to three times the value of non-land assets per arable hectare compared to the average U.S. farmer (see Table 30). Though much higher than the U.S., the Guatemalan level is significantly lower than Japan and European countries. We are wrong to imagine the small farmer as operating without high capital or asset values per hectare.

b. *Capital Productivity:* With significantly higher asset intensity per hectare we might expect the farmers' output per dollar of capital (or asset unit) to be low. What the comparison indicates is that the value of production per dollar of capital (or asset unit) for the Guatemalan small farmer is significantly higher than any developed country (see table 30). This carries with it the implication that the per $ of capital, more food would be produced in Guatemala by small farmers than in the U.S. or Europe. If we make the comparison on a per worker basis the U.S., of course, is vastly superior. This raises the question of international scarcities. If the world is essentially short of labor, the U.S. would be the best place to look for getting the most efficient food production. Since capital and arable land are likely to be the more important limiting factors, the study concludes that small farm agriculture in developing countries may provide a better food investment per $ than either the U.S. or Europe.

The harsh reality of the absolute smallness of the Guatemalan small farm removes any "level of life" optimism from the above comparisons. The small farmer near starvation would derive cold comfort from knowing that per unit of capital he is very efficient. Given present cropping patterns he is doomed to a marginal existence by the small absolute size of his operation.

D. THE IMPACT OF CREDIT ON NET FARMER INCOME: THE EQUITY OBJECTIVE

1. Regional Differences in Poverty Level and the Response to Credit.

Poverty in Guatemala must be regionally segmented to be analyzed. The Central Highlands represent the principal concentration of the problem. The South Coast, and sub-regions in the Southeast Highlands and the Northeast have significantly higher incomes. The balance of the Southeast Highlands and the Northeast lie between these income extremes (see table 34).

The principal conclusion of the study in this regard is that those on the lowest end of the income scale make the most impressive response to credit. Stated differently, the smaller credit farms in the poorest regions obtained much more income per person than did the comparable no-credit group. The farms in the higher-income regions with credit show much smaller differences, and in the highest income region (the South Coast) the net income per capita on credit farms is actually lower than on the non-institutional credit farms. While this finding about the South Coast is unreliable due to small sample size, the thrust of the conclusion remains intact i.e., that the lowest income farmers with credit show by far the highest income superiority over their comparables (see tables 33, 35 and 36).

2. Farm Size Differences and Response to Credit

The magnitudes of these income differences are encouraging indeed. The average income superiority of all small credit farms (0-10 Hectares) in the central highlands was 63%. The 0-1 Hectare credit group earned more than three times as much as their control group and the 3-5 Hectares credit group four times as much.

The net income differences associated with credit are even more dramatic in the poverty areas than the rather encouraging production differences. If the income differences are replicable for a large portion of the small farmers in the highlands, the potential of credit for making a significant contribution to the "equity" objective is impressive. Only actual expansion of credit into broader numbers of these farms will provide the real answer to the replicability question; what the study suggests is that the income performances of credit

recipients has been much superior in the critical poverty regions compared to similarly endowed and located no-credit farmers.

The study concludes that credit should be concentrated in the three regions where the income associated performance has been dramatic, and leave the South Coast until other evidence is available.

3. Capacity for Loan Repayment

Using the farm level accounts developed for the sample, a number of conclusions bearing on important banking issues were derived. From a technical point of view it appears that almost all of the production processes which are represented in the sample are financially profitable enough to be "bankable" at current interest rates (see table 90). This means that there is enough net income generated above costs to pay reasonable interest rates and leave the farmer a significant residual return per Dollar or Quetzal. This conclusion supports the position that non-concessional interest rates would be bearable by the farmer. No one would deny that concessional interest rates will in the short run leave the farmer with more income, but this study finds that such rates are not necessary to turn losses into profit. The small farmer lacks access to larger quantities of credit and not necessarily to cheaper credit. If a higher price on credit implies a larger long-run supply, it would appear to be short sighted from the small farmers' point of view for the rate to be concessional.

Repayment delinquency and default has plagued most small-farm credit programs, and it has been usually assumed that this was related to an underlying inefficiency of small-farm technology which due to its unprofitable nature prevented timely repayment. The study contains no direct evidence on what causes delinquency except that it appears not to be a lack of financial productivity at the farm level. An alternative explanation which is consistent with the data is that the small-farm business, even though the per-unit profitability is good, produces such a small absolute quantity of net income that the farmer is unable or unwilling to hold the income generated out of consumption to make repayment. The kind of severe legal sanctions required to force this sacrifice on farmers living at near starvation levels may not exist in practice, and from a humanitarian point of view perhaps should not be imposed. Thus forgiveness of loans or their rescheduling is a form of subsidy which perhaps should be considered in cases of extreme hardship. This would be preferable to granting "across-the-board" concessional interest rates.

E. THE IMPACT OF CREDIT ON RURAL EMPLOYMENT.

1. The Dimensions of Rural Unemployment.

The study concludes that the portion of time which is gainfully employed is low for all farms, never exceeding 43% of the available work days (see Figure 17). The on-farm employment is even lower since these estimates include work done outside the farm. In the three poverty regions, the employment rates for small farms on an annual basis range from 17-21%. This implies that less than one-fourth of the available time is employed on the farm. From the figures, it can be seen that income levels would be raised dramatically if there were no change in the wage rate but just if the annual average employment rate were raised to the seasonal peak of 50%.

2. Farm Size and Employment

The level of employment is related very closely to farm size with the owners of larger farms able to absorb more of their own labor. This situation is dramatically demonstrated by the fact that in the peak labor use month of May, the 0-1 Hectare farms are able to utilize only 6% of their labor while the 10 + Hectares farms utilize 81%. (See Figure 18). In the Central Highlands during the peak labor month in that region only 25% of the family labor on all farms is utilized.

3. The Impact of Credit on Employment through Increasing Area & Labor Intensity

Credit appears to have had a significant positive impact on employment. Credit farms in all size classes utilize more labor per hectare cultivated than do the control farms. From 20% to 42% more labor is used on credit farms (see Tables 41 and 42). In large part this is accounted for by additional utilization of available family labor, but it is also caused by increased purchases of labor. This added labor intensity on the credit farms is complemented by the additional labor required by the expanded area cultivated.

4. Crop Mix and Employment.

The additional employment on credit farms is not due to increased labor for a given crop, but rather to the difference in crop mix between the two groups. Small farms absorb up to ten times as much labor per cultivated hectare than do the largest farms. For the most part, this appears to be due to the more labor-intensive crop mix on the smaller farms. It is suggested that the same crop-mix changes which

appeared to have long run production and income potential will also have the best possible impacts on the employment problem.

5. The Employment Impact of Crop Mix and Technology Choices When Capital and Arable Land are Scarce

Given the scarcity of capital in Guatemala, the amount of capital necessary to provide a productive workplace in agriculture is an important factor. This question bears on the kind of technology which is to be promulgated in Guatemala since, employment and the capital requirements for generating it, are extremely sensitive to the type of technology. In the U.S. the capital costs of generating one full time workplace in agriculture is currently about U.S. $41,000 compared with efficient Guatemalan technologies at between $400 –2,000 (see table 4.4). Research is needed to provide technological packages which are increasingly efficient in this range, hopefully at the lower end of that range. Crop-mix alternatives exist which could efficiently double the amount of labor used per arable hectare but more research is necessary to reduce the capital requirements per unit of labor in these crops. This kind of research is not currently underway in Guatemala or in other countries with which the author is acquainted. Guatemala is faced with important employment policy choices which require more information than is currently available.

In conclusion credit appears to be an important catalyst for the adoption of a more labor-intensive crop mix. This change in mix is essential to significant long-run increases in employment and income.

CHAPTER TWO: OVERVIEW OF BASIC ECONOMIC INDICATORS

A. POPULATION

The estimated population of Guatemala in mid-1973 was 5,810,000 and its average annual growth rate of 3% while high is only average for the Latin American area. The age distribution of the population is also similar to that of other Latin American countries with 44% of the population under 15 years of age. Sixty-four percent of the people live in rural areas but the growth rate of the rural population averaged approximately 2.5% annually from 1960 to 1970 while the urban rate was around 4.2%. The highlands contain most of the population while the Peten region is sparsely populated with only around 1.1 persons per square mile.

B. DEVELOPMENT TRENDS

The gross national product in 1973 was 2,275 million U.S. dollars (1972 prices) and the average annual growth rate from 1960 to 1970 was 5.4%. The growth rate increased towards the end of the last decade (1968-73) to 6%. The 1973 per capita GNP was $406 compared to that of Panama, $873 and Honduras, $273. The growth rate of per capita GNP was 2.9% from 1960-70 and 3.2% from 1968-73.

Agriculture's contribution to the GDP was 28.2% of the total in 1960 and decreased to 25.4% in 1971 taking second place to commerce (33% of the total). The average annual rate of growth of agricultural production was 4.5% from 1961-71 compared to a growth rate of 7.5% in manufacturing. The principal crops in metric tons are corn, bananas, sugar and milk and the chief cash crops are coffee, cotton, beef, and sugar.

Although agriculture accounts for only around 25% of the GDP, it employs 60% of the labor force, while manufacturing employs 11% and construction, transport, finance and trade employ 26%.

Table 6.–Population

	1950	1960	1970	1970	1973
Mid-Year Population[1] (thousands)	2 895	3 955	4 603	5 334	5 810
Percent Rural[2]	75	72	71	69	64

Growth Rates	1950-55	1960-6'	1965-70	1968-73
Population[3]	3.2	3.1	3.0	2.9
Urban[2]	n.a	4.3	4.0	4.1
Rural	n.a	2.6	2.4	2.4

Sources: 1 Foreign Demand and Competition Division, Economic Research Service, U.S.D.A. *World Population by Country 1950-73,* Washington, D.C. May 1974.

2 United Nations, U.N. *Monthly Bulletin of Statistics,* New York, November 1971, pp XXXIX and XLIV and A.I.D. *Data Book* "Guatemala" Washington, D.C. January 1974. 12p. p 8.

3 Unpublished Data from FDCD/ERS, U.S.D.A., Washington, D.C.

C. EDUCATION

Since Mayan (dialect) speaking Indians make up over 50% of the population, the rate of illiteracy is quite

Table 7.–Gross National Product

(U.S. dollars - constant 1972 prices)

	1950	1960	1965	1970	1973
GNP (millions)	771	1 117	1 440	1 884	2 275
GNP per capita	220	274	315	364	406
Implicit Price Index (1972=100)		92	91	99	109

percent change

	1950-60	1960-70	1960-65	1965-70	1968-73
GNP	3.8	5.4	5.2	5.5	6.0
GNP per capita	2.2	2.9	2.9	3.0	3.2

Source: Statistics and Reports Division, Office of Financial Management, Bureau for Program and Management Services, A.I.D. *Gross National Product, Growth Rates and Trend Data by Region and Country,* May, 1974. Washington, D.C. 18p. pp 11-14.

Table 8.–Gross Domestic Product by Sector

(Q Millions, 1960 Constant Prices)

	1960	% of Total GDP	1971	% of Total GDP	1961-71 % Annual Growth[1]
Agriculture Forestry and Fishing	294.6	28.2	480.7	25.4	4.5
Mining	1.9	0.1	1.8	0.1	0.0
Manufacturing	133.1	12.7	293.0	15.5	7.5
Construction	20.8	1.9	28.5	1.5	3.0
Electricity, Gas and Water	7.0	0.6	21.6	1.1	11.0
Transport, Storage and Communications	42.3	4.0	88.9	4.7	7.0
Commerce	310.5	29.7	623.8	33.0	6.5
Banking and Insurance	12.7	1.2	29.6	1.5	8.0
Housing	92.8	8.8	128.2	6.7	3.0
Public Administration and Defense	65.0	6.2	90.1	4.7	3.0
Services	63.0	6.0	103.9	5.4	4.5
Totals[2]	**1043.6**	**100.0**	**1890.1**	**100.0**	5.5

[1]Estimated to nearest 5%
[2]Figures may not total exactly because of rounding

Source: Regional Office for Central America and Panama, A.I.D. *Development Assistance Program Central America Chapter VIII, "Guatemala"*, Washington, D.C. September, 1973, 77 p. p.8.

high. It was last estimated to be around 62% in the early 1960's and is probably one of the highest illiteracy rates in Latin America. Correspondingly it has one of the lowest school enrollment rates in Latin America. In 1971 only 38.3% of the population five to fourteen years of age and 11% of the population fifteen to nineteen years of age were enrolled in primary and secondary schools. Although education is available to over 65% of the rural population, the vast majority of rural children do not go beyond the third grade and only 2% of those who begin the first grade complete their sixth year. In the urban areas 40% of those who enter the school system complete the sixth grade and 85% of those go to secondary school.

D. TRADE BALANCE

High prices for Guatemala's major agricultural exports along with the diversification of exports have contributed to a healthy surplus in the trade balance in recent years. In the last five years the surplus has ranged from 21.6 millions of U.S. dollars in 1968 to 77.2 millions of U.S. dollars in 1973 with only 1971 showing a trade balance deficit. Net international reserves have shown a constant rise from 71.6 millions of U.S. dollars on Dec. 31, 1969 to 212.1 million on Dec. 31, 1973.

In 1973 Guatemala's exports estimated at $472 million dollars, with agricultural exports maintaining their prominent positions. Although coffee and bananas still make up a large percentage of Guatemala's exports (31.7% and 6.8% respectively), sugar and meat have become more important in the last decade. Meat has risen from .1% of total exports in 1960 to almost 6% in 1972 while sugar has gone from .1% to 4.1% during the same period.

Table 9.–Balance of Trade

(Millions of U.S. dollars)

	1969	1970	1971	1972	1973
Trade Balance f.o.b.	21.6	30.5	–3.0	41.8	77.2
Reserves	71.6	78.3	93.5	134.9	212.1

Source: International Monetary Fund. *International Financial Statistics*, Vol. XXVII No. 11 Wash., D.C. Nov. 1974. pp. 158-161.

Aside from agricultural diversification there has been an increase in the export of manufactured goods from

3.4 million dollars in 1960 to 94 million in 1971. Most of these manufactured goods have gone to other Central American Common Market countries.

E. INTERNATIONAL LOANS AND ASSISTANCE

The transportation sector has received the largest share of loans granted by the I.D.B., the I.B.R.D. and A.I.D. in the last eighteen years (22%). The agriculture sector has received approximately 18% of the total, almost half of which was accounted for by an A.I.D. rural development loan (23 million $U.S.).

In fiscal year 1973 A.I.D. committed approximately 3.7 million dollars in the form of grants, 5.8 million in the form of loans and 2.3 million in PL480 shipments to Guatemala. Of this total, food production and nutrition had priority with 65% of the total. The A.I.D. program is geared to support Guatemala's primary objective, the improvement of rural living standards. The agricultural loans are directed toward rural development and the improvement of the income and employment of traditional farmers and handicraft workers. The Ministry of Education is being assisted in the analysis of primary and secondary education systems and in initiating an experimental education program aimed at the illiterate rural adult population. The health probram also places emphasis on rural areas with the establishment of a training program for rural health technicians, the procurement of equipment for rural health posts and the improvement of regional hospitals.

F. AGRICULTURE

The total area of the country is 42,000 square miles (third largest in Central America) of which approximately 23% is considered to be agricultural land. The northern Peten area is mostly forested and agriculturally underdeveloped with some shifting-

Table 10.–International Loan Authorizations

	(thousands of U.S. $)	% Total	
A.I.D.	87 212	32.5	1959-73
I.D.B.	114 167	42.6	1961-73
I.B.R.D.	66 500	24.8	1955-73
Total	**267 879**	**99.9**	

(millions of U.S. $)

Loans	A.I.D.	I.D.B.	I.B.R.D.	TOTAL	%
Transport	8.2	32.9	18.2	59.3	22
Energy	7.0	3.3	22.0	32.3	12
Agriculture/Rural Development	27.5	16.8	4.0	48.3	18
Industry	3.4	3.7		7.1	3
Multisectoral	10.0	4.7		14.7	6
Water & Sewage		33.3		33.3	12
Communications			16.0	16.0	6
Housing		9.9		9.9	4
Education	9.3	9.3	6.3	24.9	9
Health	8.1			8.1	3
Other	13.7	.2		13.9	5
Total	**87.2**	**114.1**	**66.5**	**267.8**	**100**

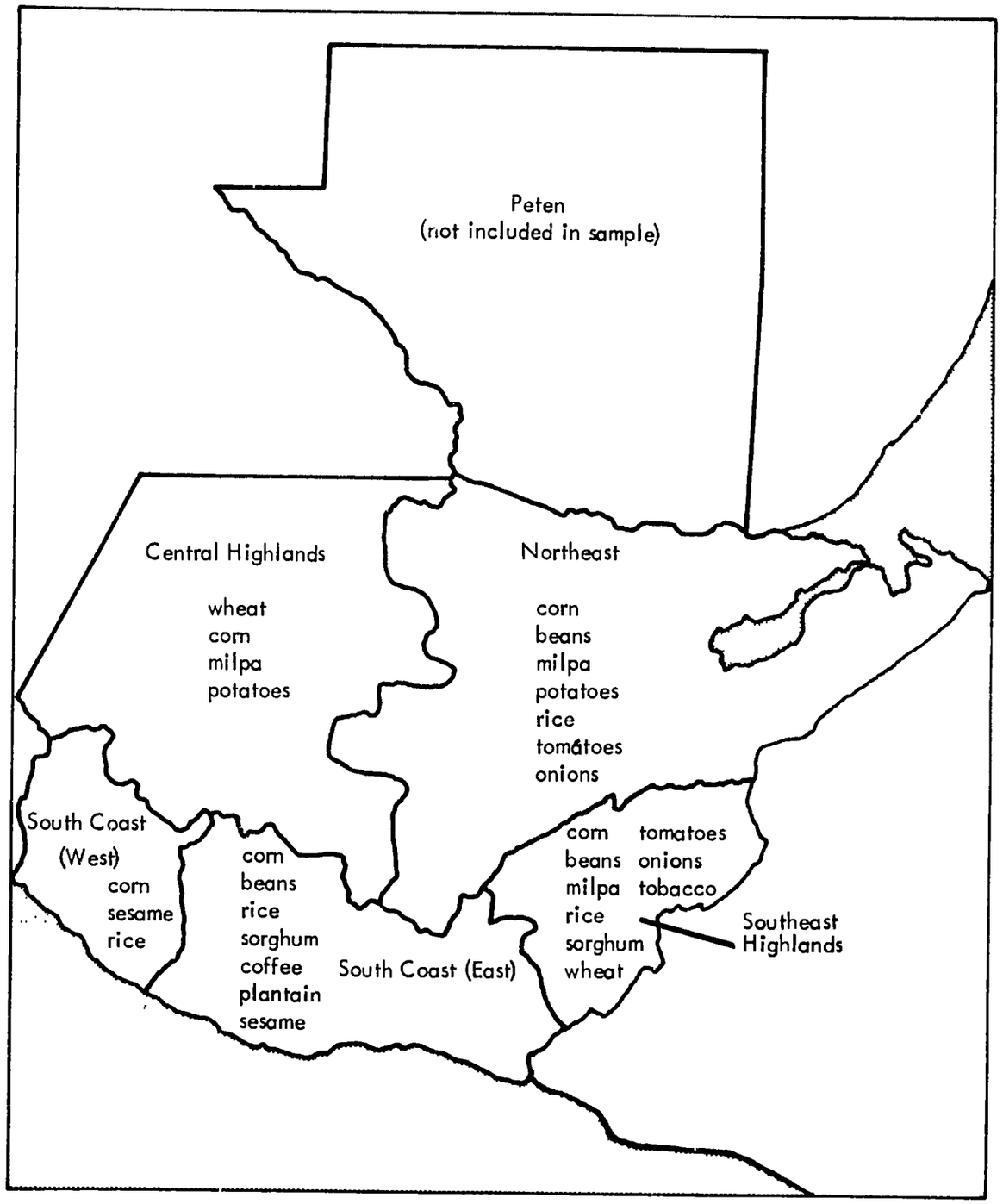
Sources: Office of Financial Management, Washington, D.C.

A.I.D. *Status of Loan Agreements,* W224, Washington, D.C. June 30, 1974, pp. 51-54.

I.B.R.D. *Statement of Loans August 31, 1974.* Washington, D.C. p.9.

I.D.B. *Statistical Annex to the Monthly Report on Loan Requests and Technical Cooperation,* June 1974, Document GN-1010-5, Washington, D.C., p.15.

Figure 1.–Guatemala: Important Crops by Region



Source: Regionalización de la República de Guatemala. Plan Nacional de Desarrollo Agrícola

cultivation. Moving south, the sourthern parts of the Department of Alta Verapaz and parts of Izabal and Quiche in the northern half of the Northeast Region have basically low income agriculture which produces corn, beans, milpa[1] and potatoes. The Central Highlands' Departments of Huehuetanango, Totonicapan and large parts of San Marcos, Chimaltenango, Baja Verapaz and Guatemala are also primarily low income agricultural regions with wheat, corn, milpa and potatoes. The more diversified crop areas comprise most of the Southeast Highlands Region (Departments of El Progresso, Zacapa, Chiquimula, Jalapo, Jutiapa) and the valleys of the Rio Hondo, and Rio Grande in the southern part of The Northeast Region. Aside from the principal crops (corn, beans and milpa) they produce tobacco, onions, tomatoes, rice, sorghum and wheat. The 10-25 mile wide pacific coastal plain produces corn, beans, sesame, rice, sorghum, coffee and plantain. Sugarcane, cotton and various other agricultural products are also produced but the crops mentioned were found to be the most important ones in the sample upon which this study is based.

The production indices for Guatemala published by U.S.D.A. show a considerable increase in both agricultural production and per capita agricultural production. From a 1961-65 base of 100 the 1973 index was up to 155 and the per capita index was up to 116. This reflects one of the highest rates of growth in agricultural production in Latin America. In 1973 production was up 8% from 1972 and basic food crops were responsible for most of the growth with a 12% increase.

[1] In Guatemala the term milpa refers to the interplanting of corn and beans.

Table 11.–Value of Agricultural Production by Commodity

COMMODITY	(Millions of Dollars at Constant Prices)										Prelim.
	1961-65	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Wheat	3.3	3.8	3.9	3.1	4.4	4.7	4.7	3.9	4.9	5.7	5.7
Rice, Paddy	2.0	2.4	2.0	2.2	2.4	2.9	3.0	3.1	7.0	4.6	4.6
Sorghum	1.1	1.2	1.9	1.5	1.4	1.5	1.5	1.5	1.6	1.6	1.6
Corn	33.6	36.1	37.9	40.9	38.6	41.2	41.2	42.6	41.8	37.3	42.6
Beans, Dry	4.9	5.5	5.4	6.9	9.3	9.3	7.8	9.5	10.4	7.3	9.6
Potatoes	1.1	1.2	1.1	1.1	1.2	1.3	1.2	1.5	1.6	1.6	1.7
Tobacco	1.2	1.2	1.2	2.3	1.7	1.2	1.2	1.7	1.7	1.7	2.3
Cotton	27.5	30.6	38.7	28.8	34.2	32.9	23.9	24.8	36.9	42.8	46.4
Cottonseed	5.5	6.1	8.1	5.8	7.0	6.5	4.8	4.8	5.6	7.9	9.6
Bananas	8.4	7.6	6.4	6.9	6.6	9.7	15.5	18.2	21.1	22.4	23.9
Coffee	66.5	59.8	75.0	61.0	67.7	63.4	64.1	67.1	76.9	82.4	83.6
Rubber	0.0	0.0	0.3	0.6	0.9	1.2	1.2	1.2	1.2	1.2	1.2
Subar, Raw (Centrifugal)	9.9	11.5	10.6	12.6	14.5	12.2	13.8	14.2	16.3	18.8	21.6
Sugar, Non-Centrifugal	2.6	2.2	2.2	2.2	3.2	3.6	3.6	3.4	3.4	3.4	3.4
Cattle Imports	1.3	1.7	1.4	1.7	2.0	1.7	1.6	0.9	0.7	0.5	0.5
Beef and Veal	14.4	15.1	14.7	15.4	17.2	20.0	20.0	20.3	22.8	22.1	22.4
Pork	4.2	4.2	4.2	4.2	4.8	4.8	5.4	6.0	6.0	5.4	5.4
Milk	12.1	13.9	12.7	13.9	15.0	16.3	17.0	17.6	18.2	18.8	19.5
Aggregates of Production											
Crops	167.4	169.2	194.7	175.9	193.1	191.6	187.5	197.5	230.4	238.7	257.8
Livestock	29.7	31.4	30.2	31.8	35.0	39.4	40.8	43.0	46.3	45.8	46.8
Total Agriculture	197.1	200.6	224.9	207.7	228.1	231.0	228.3	240.5	276.7	284.5	304.6
Total Food	102.0	109.0	109.7	115.0	123.6	132.3	137.9	145.7	160.0	156.4	171.1

Source: Foreign Demand and Competition Division, Economic Research Service, U.S. Dept. of Agriculture *Indices of Agricultural Production for the Western Hemisphere 1964-73.* Wash., D.C. May, 1974 33p. p.21.

Table 12.—Agricultural Production Indices

	(1961-65=100)									Prelim.
	1961-65	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Crops	100	101	116	105	115	114	112	118	133	143	154
Total Agriculture	100	102	114	105	116	117	116	122	140	144	155
Total Food	100	107	108	113	121	130	135	143	157	153	168
Per Capita Agriculture	100	99	107	96	103	101	97	99	110	110	116
Per Capita Food	100	104	102	103	107	112	113	116	124	117	125

Source: Foreign Demand and Competition Division, Economic Research Service, U.S. Dept. of Agriculture *Indices of Agricultural Production for the Western Hemisphere 1964-73*. Wash., D.C. May, 1974 33p. p.21.

CHAPTER THREE: POLICY SETTING OF THE ANALYSIS

A. INFORMATION FOR PLANNING

Almost all Latin American countries have mounted sizeable efforts during the last decade to frame rural development programs and policies. These efforts have in common the disconcerting fact that for the most part the planners have formulated the policies with extremely scarce information about the final subjects of the programs, the farmer and his farm. The information which is lacking yet crucial for policy formulation includes the following:

- how much net income farmers make
- how much employment they generate
- how farmers produce their crops & livestock
  - what inputs and how much of each is used
  - what outputs are created
- what resources they have available and how much of each they use.

The national information, which in some cases is available, is limited to the size of farms and quantities of major crops produced for sale.

B. ROLE OF SMALL FARMS

Early (1950's) economic development theory held that the principal role for agriculture was as a source of labor to fuel the central engine of development, industrialization. As it became more and more apparent that agriculture had more than labor to offer to the economic growth process, theory began to focus on "modernizing" agriculture. This usually meant focusing on the farmer with potential for mechanized "modernization", which in turn led to a central concern with technological advance on the larger holdings. In the late sixties A.I.D. can take some credit for the initial program movement to assist the small farmer with credit and technical assistance. In many cases this small farmer focus was argued on a carefully guarded basis, and its proponents would be careful to say little about the "productivity" impact of their programs, but rather talked about the welfare benefits to the "disadvantaged" portion of the rural sector. Impressions about the small farmer in most Latin American countries were drawn from "field experience" and not from any systematic data base. These "field experience" impressions might be summarized as follows:

1. The small farmer is a subsistance farmer, eating most of what he grows and selling very little. This lack of market involvement is a principal index of his poverty. Agriculture is "dualistic" with small, inefficient and poor subsistance farms on the one hand and wealthy, large, and highly productive "commercial" farms on the other.[1]
2. The small farmer is generally situated on holdings too small to be economic and too hilly to be mechanized with the commercial holdings occupying the only good valley land where mechanized modernization can take place.
3. The small farmer is inefficient in his use of resources due mostly to his lack of education or training and consequent unacquaintance with modern technology.
4. If he is trained and educated, he might then make use of modern inputs and if he is "land reformed" he will have the good land necessary for efficient production.

With only sketchy agriculture census data available, Albert Berry[2] began to build a convincing case that our small farmer axiom #3 is mistaken; on a comparative basis the small farmers produce more per hectare than do the large ones. Berry's conclusions are supported by later studies in Colombia.[3] With one of the basic axioms in question, many began to wonder if the "field experience" impressions of small farmer agriculture might not be too sketchy to be worth using for program design. Micro studies in Colombia (INCORA/A.I.D.)[4] found that "level of subsistance" is not a good indicator of poverty because as farm size and income increased,

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[1] A.I.D. *Spring Review of Small Farmer Credit.* Washington, D.C. June 73. No. SR119. Vol. XIX.

[2] Albert Berry, *Land Reform and The Agricultural Income Distribution.* Yale University, New Haven Conn. Economic Growth Center Publication No. 107.

[3] Samuel Daines et al., *Colombia Agriculture Sector Analysis: Land Use, Profitability, Farm Consumption Capital Structure.* A.I.D. Washington, D.C. 1972. General Working Document #176.

[4] IBID p. 13.

farmers became more "subsistant", that is, producing a larger percentage of their total comsumption. The poorer farmers in many cases were completely "commercial" in that they sold all of their production, basically because they could not afford the luxury of using their limited land for growing lower value per hectare subsistance food crops.

C. TECHNOLOGICAL DIVERSITY

What began to emerge was evidence that Latin American agriculture is extremely diverse. This statement has been repeated but has seldom been empirically investigated and its import has been missed by most of us for many years. Its import may have been missed because farm level agriculture in the U.S. is *by comparison* not technologically diverse. If we take the principal characteristics of American farmers in a particular crop we might find a five to ten year spread in their technological levels and economic processes. That is to say, we would find a statistically small amount of the production in corn, for example, being produced with methods now ten years out of date. When that yardstick is used for Latin America we find statistically significant numbers of farmers at each point along a two thousand year technological continuum. This goes for the processing and marketing segments of the agricultural complex as well. The types of land and climate where particular crops are grown are also much more diverse. This diversity makes program design and policy formulation particularly bothersome.

D. MULTIPLE OBJECTIVES

Besides the diversity among the farms to be reached, Latin American planners have added another element which makes policy formulation even more difficult: multiple objectives. Small farmer programs are usually aimed at three different and possibly competing objectives:

1. Increasing farmer income (presumably net income including home produced consumption items).
2. Increasing the production of farm commodities to feed growing populations and contribute to "national product".
3. Provide increasing employment opportunities to rural dwellers to stem the tide of outmigration and reduce pressure on extremely limited urban employment capacity.

To these three objectives, nutrition is being frequently added as a major desired outcome.

In framing policies, the planner must first be able to estimate the impact magnitudes of any program or policy on a particular objective. This in itself is a difficult endeavor, rarely accomplished. Secondly, if he seeks to achieve multiple objectives, the impacts on each must be assessed and thirdly, trade-offs among them quantified over a range of policy alternatives.

E. MEASURING CREDIT IMPACT

One of the principal problems of analyzing the impact of credit is that credit is only added purchasing power to obtain inputs, which in turn have the impacts we wish to measure. The first task from an analytical point of view is to estimate what the credit was used to purchase. This task is made doubly difficult because of the fungibility of cash at the farm level. The farmer, if asked what he did with the credit may wish to distort his answer. He may say that he purchased a particular input with credit, when in reality he already had the cash arranged to make that particular input purchase, and the credit proceeds were used for something else. An additional, and perhaps more important source of error in a farmer's response to the credit use question, is the fact that the farmer may not know himself what the net impact of the additional credit was on the volume of his various purchases. Also contributing to the difficulty of measuring the impact of credit is the problem of isolating credit induced changes from changes which may have been induced by other variables. In the survey on which this report is based an attempt was made to hold constant several of these other potentially influential variables. This procedure is described in Appendix C.

CHAPTER FOUR: ORGANIZATION AND METHODOLOGY OF THE ANALYSIS

A. BACKGROUND OF THE STUDY

The Guatemala Farm Policy Analysis had its beginnings in the joint A.I.D./Government of Colombia Agriculture Sector Analysis. It is an attempt to build upon the farm level analytical techniques applied in the Columbia analysis and thereby attempt to obtain information bearing on the development alternatives open to the Guatemalan farmer both large and small.

The Guatemala Farm Policy Analysis began late in 1973 with conversations between personnel from the Sector Analysis Division, in A.I.D. Washington, the U.S.A.I.D. Mission to Guatemala and representatives of the Government of Guatemala from the offices of National Planning and the Ministry of Agriculture. The generous cooperation of many Guatemalan government officials has made possible the realization of the analysis.

B. FOCUS OF THE ANALYSIS

The analysis focuses at the farm level, and seeks to observe a wide variety of farm level processes. From those observations policy judgements are drawn about the impact various farm programs and policies have had, and suggest program and policy alternatives for the future. Since large public programs have been undertaken in credit, attempts to estimate the impact of this program, and to suggest future program directions have occupied a major portion of the analytical effort. Farm oriented programs of research which seek to build a better technological base for agriculture also come within the analytical reach of the study since crop level technological processes are tracked in considerable detail. The economic performance of farms and farmers will be described with a view to assessing the development potential of different types of farms and identifying those farm level factors which seem to be associated with farmer success.

To delve into the reasons behind farmer behavior and explain how to change that behavior are analytical tasks beyond the reach of even the best of currently applied social science research techniques. It is embarrasing to the economics profession, however, that the simplest kind of statistical description of the farmer, his characteristics, and situation has so seldom been accomplished as an input into the planning process. This study attempts nothing that is new or novel methodologically. The study is in essence a gross anatomy exercise to dissect and compare a reasonably large number of patients, not with the heady aspiration to find the causes or cures for their ills, but just to see what the various farms are like and which are well and which are ill, and by how much. The only tool we are using that is new to the last three decades is the computer, which allows us to quickly and cheaply group our observations in different ways. The only disadvantage of this "observation grouping" is that since we are not looking at the farms one by one, a particular grouping may for one purpose contain certain farms, which under another grouping have shifted their influence into an unexpected column in a given table. Because of the size of the sample (too small for many sub-divisions) and the bulkiness of the tabular format (not enough columns and rows per page and hence not enough sub-classifications to hold many factors constant) we may be seeing patterns in the tables that mean little. Simple statistical techniques (i.e., regression analysis) are available to hold any number of these factors constant and measure change in one of them. We may also estimate how much of this movement is explainable and what level of confidence we can place in the estimate. Such analysis takes time and requires a more structured framework of hypothesis than we are willing to posit until we have had more time for free dissection and description. This report represents that exploratory effort whose suggestions of trends, causes, and impacts will be more rigorously examined with careful statistical tests and hopefully, with more satisfactory data.

C. DESCRIPTION OF THE SURVEY

Given Guatemalan and A.I.D. interest in the evaluation of programs, the sample included 800 farms with credit and technical assistance from BANDESA/DIGESA. The 800 were matched by 800 farmers without supervised credit drawn from similar conditions and similar geographic areas. The 1600 farmers were interviewed during the first trimester of 1974 by extension agents and Ministry of Agriculture personnel. The questionnaires were coded in Guatemala and forwarded to Washington for processing and analysis

by the Bureau of the Census and USDA Sector Analysis teams. Table 13 contains a summary of the number of usable questionnaires obtained by region and farm size. The sample design is discussed at some length in Appendix C. The matching of BANDESA and non-BANDESA farms is described. The way in which we tried to approximate the classical "experimental design" with the survey is presented, and there is a table listing the *weighted* number of observations by region and farm-size class. Readers interested in a detailed description of the survey procedures, the specific instructions given to the enumerators, the questionnaire itself and an account of a typical interview are referred to Methodological Working Document #51 of the Sector Analysis Division (LA/DR) of AID.

D. ANALYTICAL TECHNIQUES USED IN THE STUDY

For the purpose of the analysis the farms will be analytically viewed both as one enterprise and alternatively as a series of individual crop enterprises. Both ways of viewing the farm have analytical benefits and the analysis will at times be treating the whole enterprise (hereafter called 'farm level') and at other times each of the individual crop or livestock enterprises (hereafter called 'crop level analysis'). Additional crop level analysis will be reported in later documents. This document attempts only a brief description of the specific methodologies employed, and these are placed in the appendices. Additional technical explanations of methodology are contained in separate methodological working documents. This document is written as much as possible without technical or professional jargon. While the narrative may lack precision which could be added by conventional notation and professional vocabulary, the treatment should be understandable to all broad gauge planners whose acquaintance with the technical vocabulary varies widely.

The richness of the data base is such that continued analysis should be undertaken by A.I.D. and the Government of Guatemala. However, this report marks the ending of the first phase of the analysis which was aimed at providing early interpretive results of the survey for use in program/policy formulation and evaluation. From the beginning of the study, our intent was to move with all possible haste to this report, without precluding the continuing work which should proceed hereafter to properly exploit the policy content of the data in the slightly longer term. This report includes all of the results of the various analytical segments which were completed as of the date of the

Table 13.–Number of Sampled Farms by Region and Farm Size

Region	Farm Size					
	0-1 Ha.	1-3 Ha.	3-5 Ha.	5-10 Ha.	10+ Ha.	All Sizes
Central Highlands						
Credit	21	80	40	25	24	190
No-Credit	43	65	35	31	16	190
South Coast (West)						
Credit	0	4	11	3	33	51
No-Credit	5	6	3	11	26	51
South Coast (East)						
Credit	0	23	29	53	39	144
No-Credit	7	45	20	22	50	144
Northeast						
Credit	9	66	41	44	81	241
No-Credit	19	85	45	39	53	241
Southeast Highlands						
Credit	3	36	38	40	31	148
No-Credi	6	41	37	19	45	148
National Totals						
Credit	33	209	159	165	208	774
No-Credit	80	242	140	122	190	774

drafting of the various chapters. It should be noted that this study concentrates on analysis of cropping activities leaving livestock essentially untouched. Livestock activity enters the analysis only in the computation of net farm income.

E. PRODUCTIVITY MEASURES

Since productivity measurements form one of the principal techniques used, some discussion of their meaning, in the context of this study, is necessary.

Factor productivities are useful in that they indicate how much of a given objective is obtained per unit of some input factor. In this analysis there are three types of objectives and hence three classes of productivities:

1. Net income (or farmer profit) productivity (gross output minus input and factor costs).
2. Food output productivity (defined as gross value of farm output).
3. Employment productivity.

While 1 & 2 are measures of outputs (gross and net) per unit of input, the third measure is somewhat more subtle. Labor is an input, thus the reader may object that we have violated a basic notion of productivity namely some output per unit of some input. When we talk about employment productivity, we have in mind the welfare and income distribution implications of employment. A working farmer is one who is more likely to stay in the countryside than moving to the deteriorating slums surrounding many large cities. Compared to the unemployed rural dweller, he has a small income which improves his chances of supporting his family adequately. Also there is the important psychological consideration of pride. The employed person has more self-esteem than the chronically unemployed one, and is presumably a more peaceful and helpful contributor to society. By raising employment, income distribution will presumably become less skewed as the lowest income groups (consisting of those who have little or no income due to unemployment) will receive higher incomes. Net income and output must be constantly cross checked to assure that the employment interest is not damaging to these two objectives since

Table 14.–Food Output Productivity Measures: Input Types used as Denominators, and Notes on Policy Use

(the numerator for all of the ratios in this table is Q of farm production)

Description of input types used as denominator in the productivity ratios.

	Per Input Factor Available	Per Input Factor Utilized
LAND	Since available (arable) land is both scarce and underutilized in Guatemala, this measure is the most useful of the Land Productivities. This guide would direct the planner to select alternatives yielding maximum and Gross Farm Product from the limited land base.	An interesting technical and agronomic measure of output per cultivated hectare. Not particularly useful for policy purposes in Guatemala as it ignores problems of idle land.
LABOR	Extremely important as a policy indicator of the efficiency of labor use. May be used as a guide for productive employment. Can also be used as a rough overall indicator of Nutritional Welfare.	Useful as an indicator of Labor Content in Production. A low value for this measure indicates a high labor component, and hence an attractive employment alternative. This measure must be utilized in conjunction with the "available" Labor Productivity to insure that the high labor content is at the same time output increasing.
CAPITAL	Best indicator of efficiency of capital from society's food production perspective. (the only capital measure we are able to make given the data contained in the survey)	(No data available in the present survey to evaluate this measure.)

they may be competing in some cases. Thus we differentiate between measures of "employment productivity" and "net income productivity".

Within each of the three classes of productivity measures just mentioned, there are several possible ways in which they can be viewed. Each of these objectives or "outputs" may be tied to any one of several inputs. Three broad groupings of input factors are considered in this study. They are: the traditional land, labor and capital. Tables 14, 15 and 16 outline the various productivity measures for each objective and how they will be used in this report.

Before presenting these tables, a comment must be made on the distinction there is between "utilized" and "available" inputs. This distinction is only useful when the input factor is not fully utilized since at (or near) full factor employment the two measures are identical. Since labor and arable land are both underutilized in Guatemala, the distinction is critical at least for these two factors. For capital both conceptual problems and the difficulty of measuring utilization rates make the distinction for capital impossible in this study.

Table 15.–Net Income Productivity Measures: Input Types used as Denominators, and Notes on Policy Use

(the numerator in all of the productivity ratios is Q of net income.)

	Per Input Factor Available	Per Input Factor Utilized
LAND	This is useful in that it indicates the farmer's efficiency in Producing Profits from his limited arable land base. At the National Level it indicates the Farm Income efficiency of land use.	No direct policy significance for Guatemala.
LABOR	This measure is the best indicator of farmer real income or net welfare.	When used in conjunction with two labor output Productivities this can be a useful rough indicator of the profitability of labor use.
CAPITAL	Critical measure of Financial Profitability and "Bankability".	Not possible.

Table 16.–Employment Productivity Measures: Input Types used as Denominators, and Notes on Policy Use

(the numerator in all these productivity ratios is man days of employment)

	Per Input Factor Available	Per Input Factor Utilized
LAND	A useful indicator of the employment efficiency of land use at the Farm Level.	Useful at the Crop Level Only.
LABOR	This measure simply quantifies the employment rate.	Not meaningful.
CAPITAL	This indicates the Capital Cost of creating Employment, important in Guatemala where capital is scarce.	Not computed.

CHAPTER FIVE: THE IMPACT OF CREDIT ON FOOD PRODUCTION

A. OUTPUT LAND PRODUCTIVITY

1. Population Pressure on Arable Land

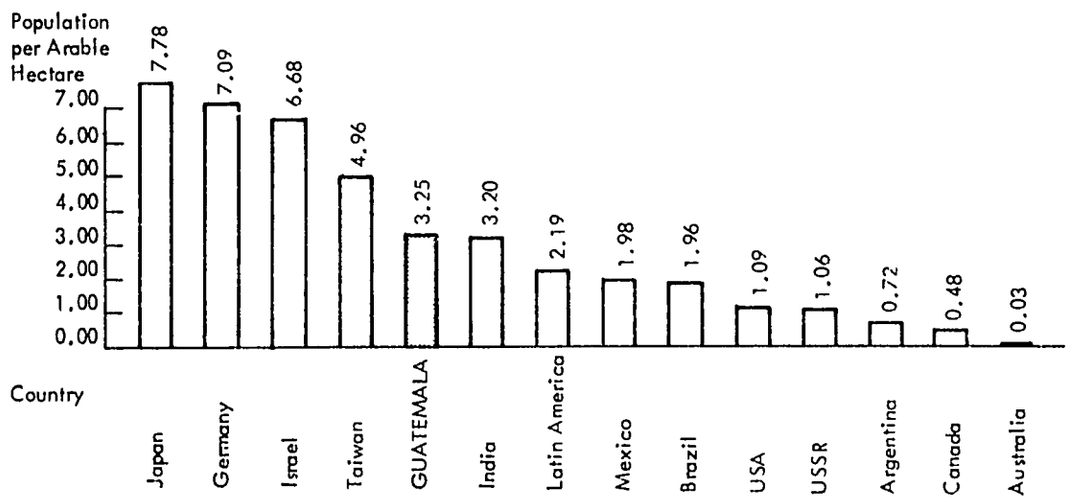
Arable land is in short supply in Guatemala when compared with the population it supports. Table 17 and Figure 2 present comparisons with selected countries of population per arable hectare. There are a number of countries with significantly higher densities than Guatemala that have been able, through crop mix and technological changes, to maintain high output per person employed, support their own populations, and sustain dynamic food export activity. Taiwan and Israel are good examples. These two countries, however, must be sharply distinguished from Guatemala by the high levels of output per hectare they are able to produce. It is worth noting at this point, that both Taiwan and Israel have been able to sustain these high levels of output per hectare in large part because of the crop composition of their agriculture sectors. Both Taiwan and Israel have become oriented to extremely intensive fruit and vegetable crops. It is inconceivable that such high outputs could be achieved by basic grains and livestock, as these crops are simply too land extensive even with very advanced technology. Guatemala must support three times as many people per arable hectare as the U.S. and 4 1/2 times as many as Argentina. The necessity of increasing output per arable hectare is therefore a critical objective.

Table 17.–International Comparisons of Population Per Arable Hectare

Japan	7.78
Germany	7.09
Israel	6.68
Taiwan	4.96
Guatemala	3.25
India	3.20
Latin America	2.19
Mexico	1.98
Brazil	1.96
USA	1.09
USSR	1.06
Argentina	0.72
Canada	0.48
Australia	0.03

Source These calculations are based on FAO *Yearbook of Agriculture 1969*, Rome, 1970 While more accurate figures are available for Guatemala they would not be as comparable as the one presented here

Figure 2.–International Comparisons of Population per Arable Hectare



2. Strong Performance of the Smallest Farms

In Chapter 8 we present land use comparisons and find the credit farms to be more intensive cultivators of their arable and total land base. The output per land unit is presented in Table 18 and Figure 3. Table 18 and Figure 3 by themselves indicate the generally superior performance of the credit farms with respect to the land productivity measure. The unusual performance of the 0-1 Ha. farms has important policy implications indicating the high short run potential of these farms.

Table 19 quantifies the comparative superiority of the credit farms in achieving the objective of increasing output per hectare.

The simplest policy implication is that small farmers produce much more per arable hectare and per $ of capital than larger ones and should be the focus of development programs aimed at increasing food production. The most important factor appears to be farm size and not credit; only in the smallest group is the credit superiority large enough to be significant.

3. Regional Differences in Land Productivity

Since there is considerable regional variation in output patterns, we must investigate the consistency of

Table 18.—Food Output Productivity of Land by Credit Type, Farm Size[1] and Productivity Class

Farm Size (Ha.)	Q of Output/Ha. of Arable Land		Q of Output/Ha. of Total Land	
	Credit	No-Credit	Credit	No-Credit
Small				
0-1	1221	446	1143	430
1-3	401	384	374	354
3-5	300	277	267	243
5-10	303	296[1]	264	247
Large				
10-20	208	197	168	163
20-50	214	187	170	136
50-100	64	139	55	130

[1] For many size classes, the values reported in this table are essentially the same for the credit and no-credit farms. The confidence that the differences observed are likely to be reproduced in similar farms outside the sample is measured by the "t" test. The "t" test for the conclusions of this table indicates that the confidence in credit farm superiority decreases with farm size and is only high for the smallest farms. The "t" for 0-1 Ha. = 3.8, 1-3 Ha. = -7, 3-10 Ha. = .08 and finally negative 1.68 for over 50+ Ha. size it appears that the large no-credit farms perform better.

Figure 3.—Food Output Productivity of Land by Credit Type, Farm Size, and Productivity Class

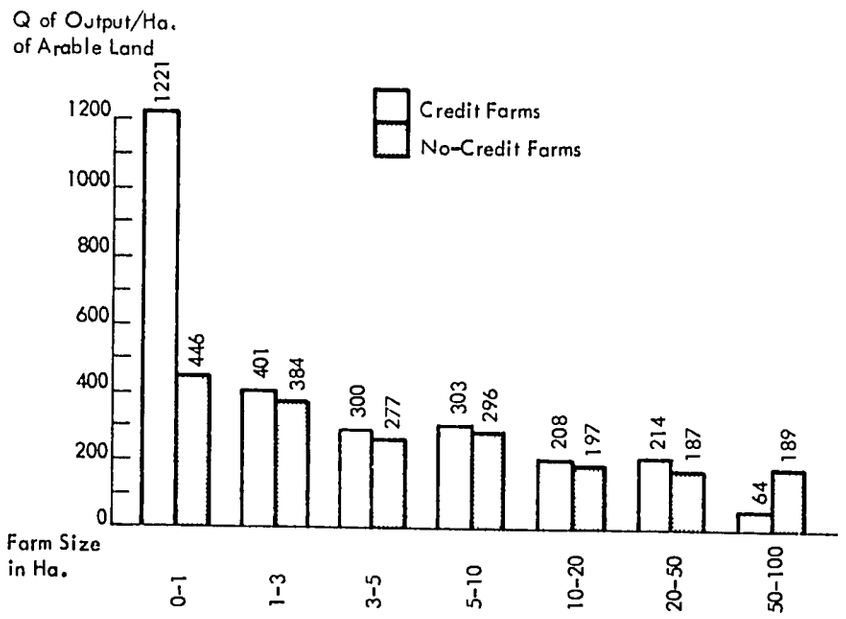


Table 19.–Comparisons of Value of Output Per Arable Hectare By Farm Size and Credit Class

Q of Output per Arable Hectare Average for all farms sampled = 100		
	Credit Farms	No-Credit Farms
Farm Size		
Small		
0-1 Ha.	548%	201%
1-3 Ha.	180%	173%
3-5 Ha.	135%	125%
5-10 Ha.	136%	133%
Large		
10-20 Ha.	94%	89%
20-50 Ha.	96%	84%
50-100 Ha.	29%	85%

Table 20.–Land Output Productivity of Arable Land By Farm Size, Region and Credit Type

Q of Output per Arable Hectare in Farm					
Farm Size	Central Highlands	South Coast (West)	South Coast (East)	North-east	South-east Highlands
Small					
0-1 Ha.					
Credit	1087	...	...	2484*	612*
No-Credit	429	428*	459	606*	298*
1-3 Ha.					
Credit	350	390*	330	774	233
No-Credit	348	191*	391	559	317
3-5 Ha.					
Credit	248	215*	338	430	289
No-Credit	145	297*	279	469	261
5-10 Ha.					
Credit	191	229*	326	379	306
No-Credit	256	264*	461	258	252
Large					
10-20 Ha.					
Credit	126	185	287	186	204
No-Credit	140	118	292	136	166
20-50 Ha.					
Credit	127	194	270	162	218
No-Credit	171	76	198	84	277
50-100 Ha.					
Credit	...	...	88	80	36
No-Credit	...	...	00	99	197

*Unreliable due to small sample size.

the conclusions we have derived at the national level in each of the regions. From Table 20 and Figure 4 it can be seen that the general superiority of the credit farms is much more marked in the smallest farm sizes, and in fact appears to be reversed in the largest farms.

B. THE SOURCES OF INCREASED OUTPUT

1. Definition of Four Basic Sources

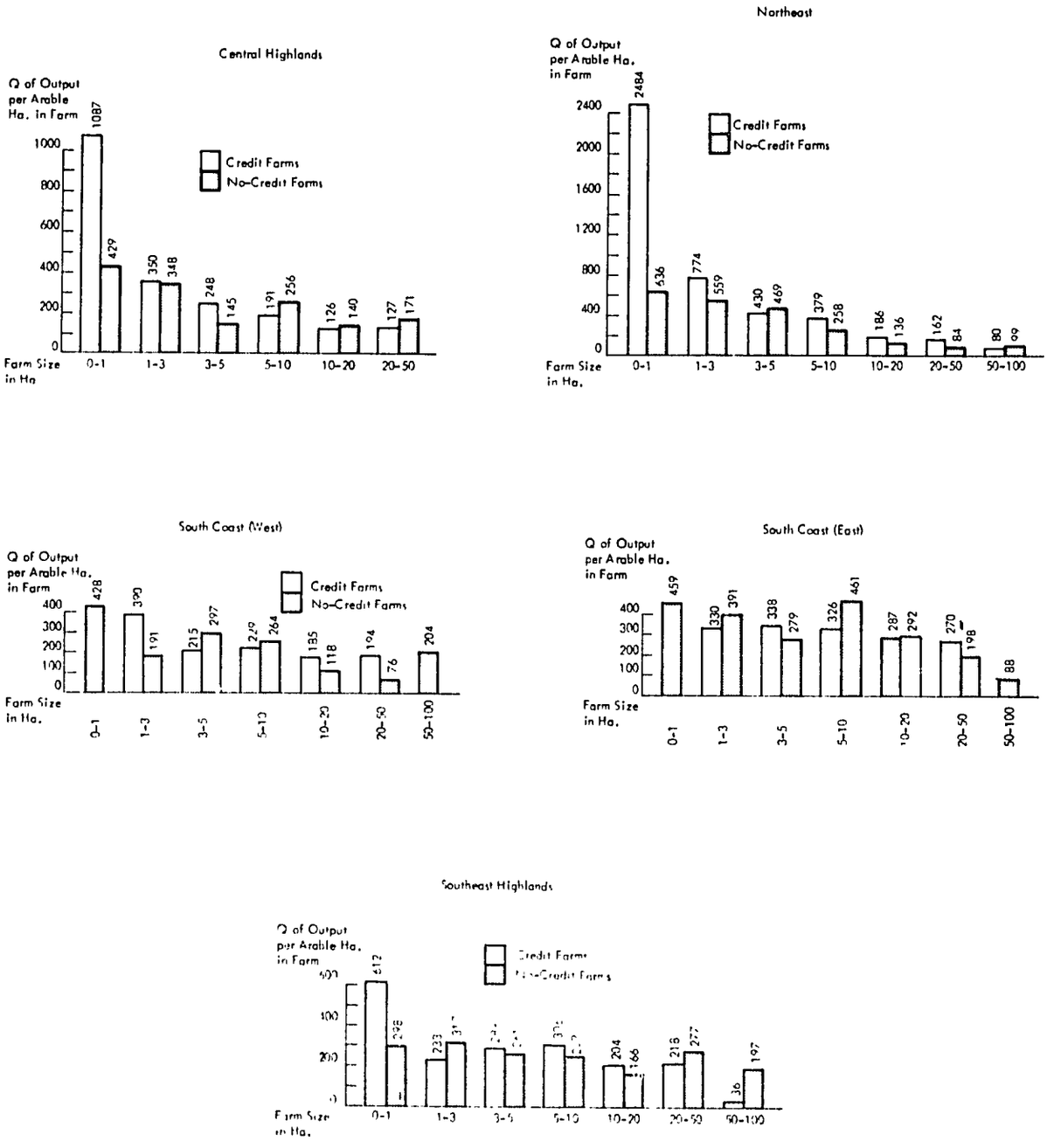
Output per farm for farms using credit may be compared with that of farms not using credit to determine relative land productivities. The differential, if any, which exists between these groups may be broken down into several sources or components. In this section a system for quantifying the impact of these sources on the overall difference in value of output per farm is presented and the results are presented. The way in which credit impinges on each of these output sources is treated less formally.

Increased value of output of one farm over another may be attributed to four basic sources:

1. Increased yields or output per hectare cultivated in a given crop (technology).
2. Increased area cultivated in a given crop (expansion).
3. Higher unit prices for a given crop output (quality differences or price discrimination).
4. Changes in crop mix.

Suppose the credit farms of a particular size in a given region achieved a 20% higher value of output than the no-credit farms. The question arises as to why they did better. Was it better yields? Perhaps they received better prices for their crops. They may have cultivated a greater area or, in other words, used more fully their arable land. Finally, they could have changed their composition or mix of crops from low value to high value crops. For instance, maybe the credit farmer planted less corn and more tomatoes on his land. Probably a combination of these four possibilities; yield, price, mix and area underlie the overall change in value of output. It is useful to know the relative contribution of each of these sources to the total change. As will be shown shortly, these relative contributions differ between farm size classes and between regions. Thus policies designed to increase yields, through application of credit may look promising in one area while credit in another region would be more productively oriented toward inducing shifts in crop composition.

Figure 4.–Land Output Productivity of Arable Land by Farm Size, Region and Credit Type



2. Overall Credit Impact on Output

Table 21 contains the national average values of the sources of output change as defined in the previous section and in more detail in Appendix B. They are broken down by farm size-class to reveal differences between these classes. The consistently better performance of credit farms in terms of total value of output per farm is reconfirmed by the figures under the "total value" column heading. The credit farms had an output per farm 32% higher than the no-credit farms. However, the smallest farms (0-1 hectares) performed an impressive 147% better while the large farms (10+ hectares) did only modestly better at 17%. This confirms the conclusions stated elsewhere in this report that the impact of credit is greater on small farms than on large.[1]

3. Output Impact of Expansion

Looking next at the sources of change in these national averages we see that expansion of area sown per farm was the major determinant of the increase in value per farm in all cases except for the smallest farms. At the level of the national average for all farm size-classes, the increase in area cultivated per farm accounted for 35% out of the total of 32% in increased value. Thus forgetting for the moment about region and farm-size differences, we would conclude that granting credit for programs aimed at increasing area cultivated would appear to have the most short-run historically demonstrated potential. This policy of course is limited in the long run by the amount of arable land available. However, as noted in Table 60 there is significant room for increasing the cultivation intensity of arable land in all farms but little room in the under one hectare group. Because the area factor is in general so important, it is treated in a separate section of this chapter after the other factors have been discussed.

The decrease in area cultivated per farm for the 0-1 hectare group is puzzling until the extraordinary change in crop mix is taken into consideration. Basically what appears to be happening is that the credit farmers in this group have changed from growing low value crops which can be conveniently interplanted to high value products which do not allow interplanting, thus lowering the cultivation intensity index.

[1] Readers who have seen the circulated draft of this report will observe that many of the results reported in Tables 21, 22 and 23 have been adjusted somewhat from their earlier values. These adjustments reflect the discovery of several minor errors in the way in which the values had been computed. Salient among these is the computation of the per-farm averages on the basis of the weighted number of farms (correct) rather than on the simple number (incorrect method used in the draft). The question of weighting is discussed in more detail in Appendix C.

4. Insignificant Yield Impact

Table 21 contains several surprises. Perhaps the greatest is negligible improvement in yields registered on credit farms. It is commonly thought that credit, especially when granted by an official agency such as BANDESA, is synonymous with adoption of yield-improving technology. At the national level in our sample, this hypothesis was born out only in the case of one farm size class, the 3-5 hectare group. In all others and in the average for all farm sizes the increase was slight and in some cases a decrease in yields was reported.

Table 21.–Sources of Change In Output Between Credit and No-Credit Farms: National Averages By Farm Size

(Percentage Superiority of Credit Over No-Credit Farms)

		Sources[1]			
Farm Size	Total Value	Crop Mix	Yield	Price	Area[2]
0-1 Has.	147	154	–4	–1	–2
1-3	37	15	1	2	19
3-5	20	–8	15	–3	16
5-10	12	–1	2	–6	17
10+	1/	–1	0	–7	25
All Size	32	0	–3	0	35

[1] These percentages have been adjusted from their raw values so as to sum to the "total value" presented in column 1. (See Appendix B for an explanation.)

[2] These percentages reflect multiple counting of multiple-cropped land as well as double counting of interplanted land.

5. Insignificant Price Impact

The prices received by the credit farmers are in some cases lower than those of the non-credit farmers. Credit farmers are assumed to have better marketing channels and as good or better quality products. Both of these factors would lead one to suspect that higher prices are paid to credit farmers. However, this is not generally the case in Guatemala.

6. Policy Implication of Sources of Output

In summary it appears that the principal credit approaches which demonstrated potential for increasing output among Guatemalan farmers are programs directed at increasing the areas cultivated and altering crop mix. In Chapter 9 we will see this position confirmed by the conclusion that credit-induced investment in technological change had a zero or possibly negative return.

From a policy point of view one could argue that the successes which are historically demonstrated ought not to be the only ones for future program focus either because they may have limited further potential or because alternative approaches have failed for reasons which are understood and therefore alterable. Expansion of area cultivated is a good case in point. This source of increase is the one with the best historical effect and one which should be exploited for whatever remaining capacity it has. That capacity is limited by the amount of available land and the ability of farmers to intensively cultivate it. Both of these appear to have enough slack that credit programs for the next decade ought to have increased area as a principal objective.

Crop mix has demonstrated potential and provides a longer run feasible hope of major impact on the three basic objectives. Its potential will be dealt with in more detail in the next section.

A yields increasing program would derive little support from the survey findings, but its potential is obvious. What then ought to be the program directions with reference to yields? The first comment here relates as much to basic research as to credit policy. In Chapter 8 we find that credit farms did employ more modern inputs and appeared to have attempted to thereby increase yields. It appears feasible therefore to get farmers to adopt yield increasing behavior. What is surprising is that our survey does not uncover any increases in yields among the credit group in response to whatever past assistance they may have received. Our attention is therefore drawn to the technical or agronomic issues underlying the role of inputs in increasing yields. Investment in research and experimentation to discover usable packages is likely to be costly and rather long-range before significant results could be expected, if other similar efforts in other countries are to be used as examples. This could either discourage planners or encourage them to increase research investment depending on their time preference for results. In any case the conclusions of the study should discourage credit programs in the near future from focusing on yield increases until better research, experimentation and extension techniques have proven the field-profitability of yield-increasing input investments.

The negative price influence observed in Table 17 is strange and deserves closer attention and perhaps some program changes to eliminate price discrimination or inferior product quality on credit farms.

Table 22.–Sources of Change in Output Between Credit and No-Credit Farms: Regional Averages

(Percentage Superiority of Credit Over No-Credit Farms)

		Sources[1]			
Region	Total Value	Crop Mix	Yield	Price	Area[2]
Central Highlands	32	11	–10	3	28
South Coast (West)	95	–7	32	2	68
South Coast (East)	13	1	–12	2	22
Northeast	58	9	1	3	45
Southeast Highlands	15	–8	–4	2	25

[1]See footnote 1 in Table 21.

[2]See footnote 2 in Table 21.

7. Detailed Regional and Farm-Size Differences

The regional differences in the source of output increase are presented in Table 22. The region with the largest percent increase in output, South Coast West, shows the highest area increase and the only significant yield increase. Crop mix changes were most significant in the Central Highlands and area increases were large in all regions. Table 23 presents more detailed source of output change results by separating region and farm size groupings.

Careful searching of the results in this table should provide a reference checklist to credit planners who are designing regional and farm size focus of programs aimed at only one of the four possible focuses:

1. Increased crop area.
2. Increased yields.
3. Changed crop mix.
4. Altered quality and price.

C. THE IMPORTANCE OF CROP MIX

1. Regional Crop Mix Differences

The crop mix varies widely from region to region in Guatemala as would be expected given the wide climatic and physical difference sampled in each region which cultivated the named crop.

Table 23.--Sources of Change in Output Between Credit and No-Credit Farms by Region and Farm Size

(Percentage Superiority of Credit Over No-Credit Farms)

Region and Farm Size	Total Value %	Source[1] Crop Mix	Yield	Price	Area[2]
Central Highlands					
0-1 Has.	112	108	–2	3	3
1-3	54	29	–3	5	23
3-5	99	34	16	0	49
5-10	–3	–5	–18	–1	21
10+	–23	–7	–13	2	–5
All Size Avg.	32	11	–10	3	28
South Coast (West)					
0-1*	..	..	..	..	..
1-3*	42	–18	36	5	19
3-5*	92	0	49	6	37
5-10*	–27	1	–20	–7	–1
10+	109	–2	41	6	64
All Size Avg.	95	–7	32	2	68
South Coast (East)					
0-1 Has.	..	..	..	..	..
1-3	–12	–12	3	–16	13
3-5	52	0	7	–2	47
5-10	–20	–18	–19	1	16
10+	18	11	–17	5	19
All Size Avg.	13	1	–13	3	22
Northeast					
0-1 Has.*	255	275	–4	–2	–14
1-3	61	43	20	4	–6
3-5	–3	–15	9	1	2
5-10	88	63	29	–22	18
10+	41	13	–3	0	31
All Size Avg.	58	9	1	3	45
Southeast Highlands					
0-1 Has.*	94	71	19	17	–13
1-3	39	–9	3	–3	48
3-5	17	–6	17	–6	12
5-10	22	–4	6	–7	27
10+	5	3	3	–9	8
All Size Avg.	15	–8	–4	2	25

[1]See footnote 1 in Table 21.

[2]See footnote 2 in Table 21.

*Unreliable due to small sample size.

The narrow focus on basic grains in the Central Highlands is one of the principal problems identified by the study. As a general conclusion it would appear that the small farms have chosen crops whose agronomic nature and cultural requirements place them in the "land extensive" category. By land extensive we mean crops which require comparatively little labor or investment per hectare, and produce comparatively less value of production per hectare. There is some range in land intensity for different technologies for a given crop, but the differences between them are much larger. Corn may be cultivated with varying amounts of labor, this variance we refer to as "inside" crop variance. For corn this 'abor intensity range in man-days efficiently utilized per hectare is probably from about 5 days per hectare (U.S. highly mechanized) to about 50 man-days per hectare in Guatemala or Colombia. The "inside" range for tomatoes on the other hand is from about 120 man-days per hectare at U.S. levels to about 300 man-days in Colombia or Guatemala. Tree crops and vegetable crops tend to be much more land intensive (that is require more labor and investment in inputs per hectare, and produce more value per hectare) than cereals and livestock products. A farmer with very limited land will find adequate income potential only if he can select a crop mix which is intensive enough to yield reasonable total income for his small land base. It is unfortunate that the very crop mix combinations which efficiently utilize more labor per hectare co-incidentally contain those commodities which are more sensitive to market and marketing factors. For many commodities the size of the urban market in Guatemala is insufficient and export markets must be competitively entered in order to support a production program in the more intensive crops. The small absolute size of the urban market in Guatemala is a significant problem. In addition the technology for growing these crops is not widely practiced by Guatemalan small farmers. The farmer skills required to transplant, prune and successfully manage tree crops are quite different from the cereal and livestock skills which are currently widespread. The small farmer environment in Guatemala for example is quite different from Colombia where a large body of small farmers have been long acquainted with tree crop and vegetable production. In this light, it is interesting to note that the general agricultural success of some of the countries with higher population densities than Guatemala such as Taiwan and Israel has come from export oriented development of very intensive tree and vegetable crops.

The Central Highlands farmers in this sample appear to have "land-intensified" the basic grain crops about as far as is practicable, through interplanting. Increased interplanting and double cropping offer significant short run possibilities for expansion of area with the infusion of added credit and this appears advisable. Even given this significant short run expansion potential with current crop mix, the long run potential for small farmers would appear to be rather bleak unless the crop mix itself can be changed so as to effect a 3 to 5 fold increase in land use intensity. It is highly unlikely that the current crops could provide that potential.

2. Impact of Credit on Crop Mix

From table 21 we observed that crop mix was the only significant source of increased output after

Figure 5.–Crop Mix by Region – Summed Over Credit Type and Farm Size
(Measured as a percent of total value of crop production)

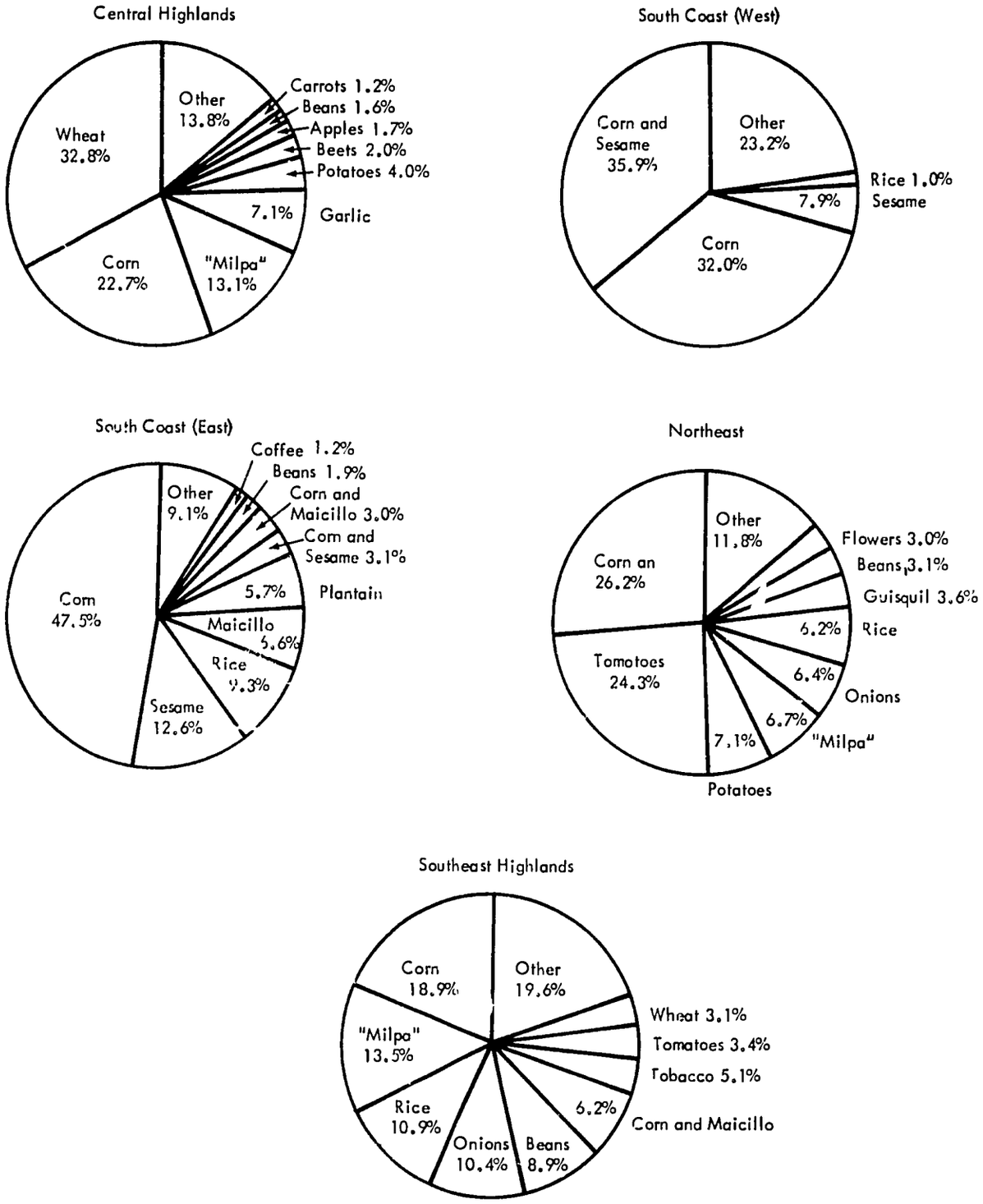
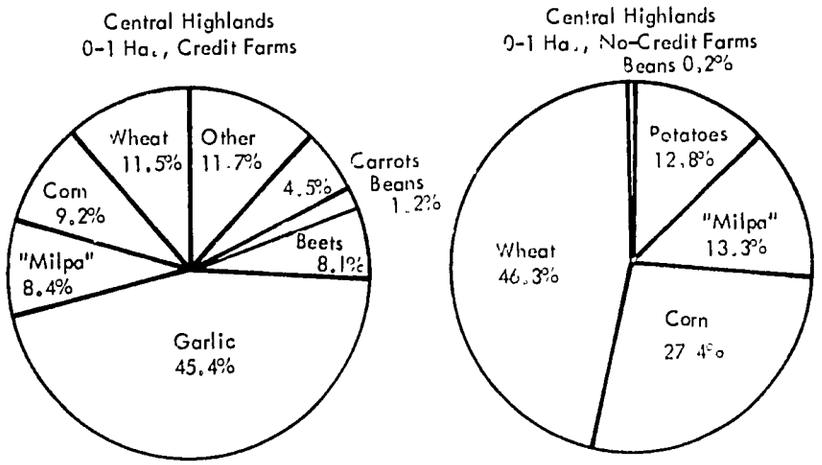


Figure 6.—Impact of Credit on Crop Mix
(Measured as Percent of Total Value of Regional Crop Production)



expanded area. It was also observed that the smallest farms experienced the most dramatic crop mix change with credit. The unusual nature of the association of credit on crop mix among the smallest farmers is illustrated in Figure 6 by the 0-1 Ha. credit and no-credit farms in the Central Highlands. This is a particularly important example because it is drawn from the poorest region and the one where crop mix might be thought most difficult to change. This shift from the cereals focus of the no-credit farms to the vegetable focus of the credit farms is a change with extreme importance for farm policy. It should be remembered that these smallest farms constitute the group with the most impressive income performance as well.

As farm size increases the influence of changing crop mix decreases. We hypothesize that the smallest farms have reached the limits of expanding area cultivated and are forced to increase incomes and output by shifting their crop mix to higher value crops. The farms over 1 ha. all appear to have made their credit induced output increases by using their land more intensively without large changes in mix. The short range potential of area expansion is least promising for the smaller sizes and therefore programs directed at altering crop mix more urgent. Credit programs for larger farms could continue to emphasize area expansion in the longer run.

3. Crop Mix Potential and Farm Size

It is interesting to note that the small Colombian credit farms not just of the 0-1 ha. range but also in the 1-10 ha. group have achieved a very intensive mix, as is indicated in Figure 7. We expect that in the near future the same impacts observed currently in only the 0-1 ha. group in Guatemala could be brought about in the 1-3 ha., the 3-5 ha. and perhaps the 5-10 ha. groups. This objective should be one of the principal aims of credit in the less than 10 ha. farms.

4. Crop Mix and Value of Output per Hectare

The dramatic output and farmer income potential of shifting crop mix can be seen from the value per hectare comparisons in Table 24. Of the crops comprising the no-credit, small farm products, all (except potatoes) lie at the lowest end of the spectrum.

5. Marketing Obstacles

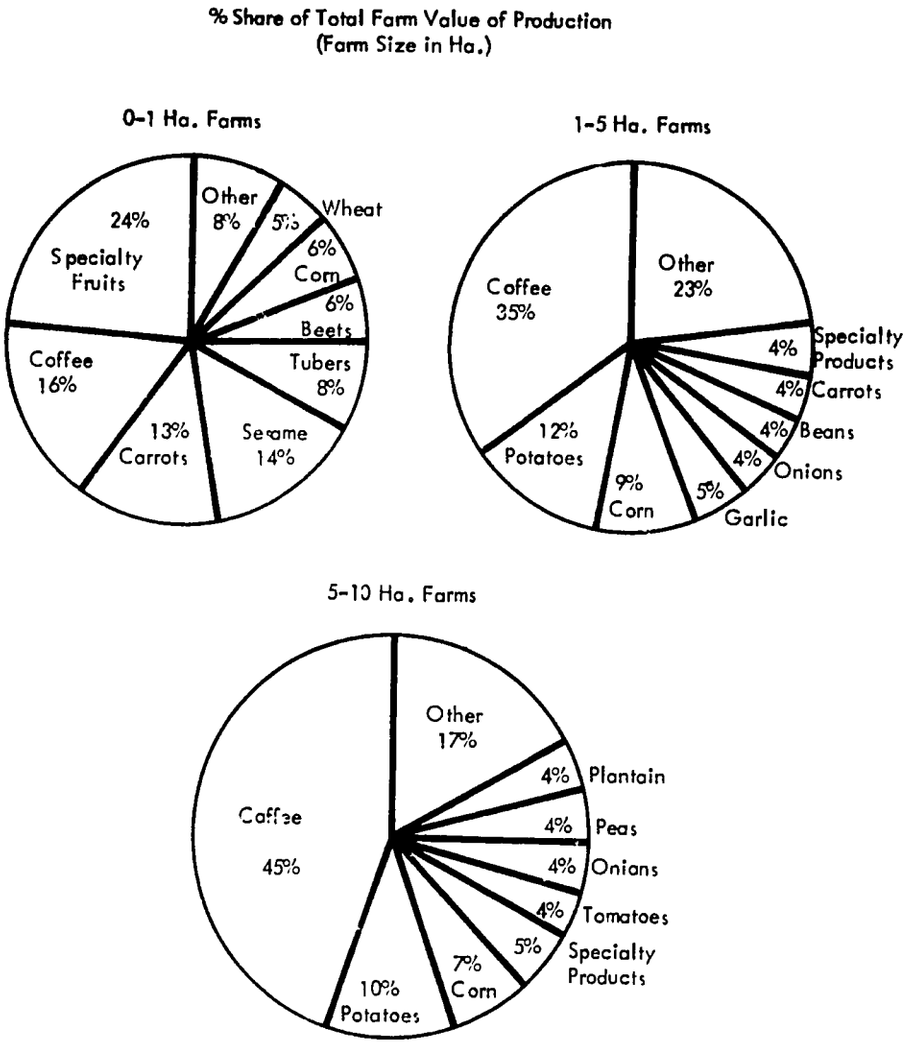
The most important obstacles to programs directed at shifting farmers into the higher value crops are marketing problems. These problems may be divided into three basic sub-problems:

1. Small absolute size of domestic urban demand for the high value crops.
2. Insufficient domestic marketing and processing capacity.
3. Insufficient export marketing channels to exploit international demand.

Domestic Urban Demand

The measurement of the dimensions of urban demand for the high value crops should be a high priority for further analysis. Perhaps more demand exists than is readily apparent.

Figure 7.–Crop Mix of Small Credit Farms in Colombia (1969)



Domestic Marketing and Processing

The higher value crops are almost always extremely sensitive to marketing due to their highly perishable nature. Grains and livestock can be stored. Flowers and tomatoes cannot. Approaching production programs as isolated activities can be dangerous. Public involvement in the financing of marketing and processing activities for the high value crops may have as much impact on production as the financing of production directly. Credit mechanisms which link the processor-marketer to the producer (contract production) are obvious alternatives which ought to be explored.

Export Marketing

Studies of the availability of international markets for the higher value crops[1] indicate a rather encouraging picture. This emphasizes the importance of programs directed at entering and competing in these markets. These studies do not however, focus on the major obstacle, local organization. Entry into these highly competative and sensitive international markets will take substantial investment and sophisticated organization not likely to occur without public action. The most urgent need is not for more analysis but for well planned, coordinated and financed business ventures to test the feasibility of entry into the markets.

[1] R. K. Van Haeften, *Markets for Fresh Fruits and Vegetables, United States and Europe*. Agency for International Development. Washington, D.C. 1972.

Table 24.–Maximum Value Per Hectare By Crop[1]

Crop	Q Value/Ha.	Crop	Q Value/Ha.
Flowers	8378	*Miltomate*	546
Pepper	5199	Carrots	477
Apples	4457	Plantain	465
Avocado	2857	Corn & Sesame	452
Oranges	2571	Horse Beans *(Habas)*	445
Onions	2490	Sugar Cane	400
Garlic	2244	Lettuce	343
Guisquil	1658	Cauliflower	342
Cabbage	1616	Beans	340
Potatoes	1609	Coffee	334
Tobacco	1500	Sesame	315
Papaya	1433	Cardamom	310
Tomatoes	1079	Banana	298
Rice	991	Corn & Beans	287
Cucumbers	786	Cassava	279
Fruit	714	Chick Peas	268
Melon	604	Corn & Sorghum	261
Hot Peppers	574	Corn	249
Beets	561	Wheat	243
		Peanuts	231

[1]The maximum is the highest regional average farm value for each crop.

Note: Crops in italics have no direct English Translation.

D. A CLOSER LOOK AT THE COMPONENTS OF THE AREA FACTOR IN FARM PRODUCTIVITY

1. Four Components of the Area Factor

"Area" as it was used in the preceding "sources" analysis is defined as the sum of all land planted in temporary and permanent crops on the farm where multiply cropped land is counted a multiple number of times and inter-planted land is counted twice. The credit to no-credit ratio of these values is the "area index" presented above. This definition of area deliberately incorporates a good deal of "double counting" so that the issue of how land is used may be explored more fully. Because the area is defined in this way the ratios presented may be broken down into four components. As is explained in Appendix B, these four components are related to the index of overall areas by means of an identity. This identity consists of four elements whose relationship to gross area and thus to output is explained as follows:

Size of Farm: If credit farmers have larger farms they may well have greater output per farm assuming no off-setting factors.

Cultivated Area (Adjusted for farm size differences): Assuming that two farms are of equal size the one having more land under cultivation will have more output.

Multiple Cropping: If one farm has more area dedicated to multiple cropping then, assuming comparable crop mix and yields, its value of output will be greater.

Inter-planting: If there is more inter planting on credit than on non-credit farms, the value of output will be greater, again assuming comparability in all other factors.

The terms measuring these components are multiplicatively related to gross area as is shown in Appendix B. In the following three tables the numerical values pertaining to these components are presented as additive percentage changes. This follows the procedure used in the preceding section on sources of change and is in fact an extension of that procedure.

The method used in reconciling the additive percentage changes with the original multiplicative index values is also discussed in the Appendix.

2. Major Determinants of Gross Area Differences at the National Level

Table 25 contains national average values for the components of the total cropped area or "gross area" as registered in table 21. As was documented in table 21 differences in total cropped area are the major determinants of differences in value of crop production between credit and no-credit farms. This is the case for all farm size classes except the 0-1 hectare group where crop mix is the major determinant. From table 25 it is apparent that differences in farm size and in area cultivated are the major determinants of differences in total cropped area. Thus the general pattern is one of greater value of output per farm on credit farms due to the credit farms increasing their total area and due to their having a greater proportion of their land under cultivation. Differences in multiple cropping and inter-planting rates appear to be slight.

Evidence presented in Appendix C in the section "On the Results of the Matching" suggests that the difference in land use among all farms at the national level may be explained by greater rates of land rental on credit farms. In addition it is noted there, as here, that credit farmers have a higher proportion of their land area in temporary and permanent crops. Going one step further one may

Table 25.—Components of the Difference in Area Between Credit and No-Credit Farms: National Averages by Farm Size

(Percentage Superiority of Credit over Non-Credit Farms)

Farm Size-Class	Total Cropped Area[1]	Components[2]			
		Size of Farm	Cultivated Area[3]	Multiple Cropping	Inter-planting
0-1 Has.	–2	6	–6	2	4
1-3	19	9	6	4	0
3-5	16	1	10	1	4
5-10	17	3	5	5	4
10+	25	7	14	–4	8
All Sizes[4]	35	17	13	–1	6

[1] These values are transcribed from Table 21 and reflect multiple counting of multiple-cropped land as well as double counting of interplanted land.

[2] These percentages have been adjusted from their raw values so as to sum to the "area" indicators presented in column 1.

[3] These values are net of differences in farm size.

[4] The percentage values for "all sizes" are not simple averages of the farm-size values. The larger farms receive greater weight in proportion to their size and number.

hypothesize that credit recipients are applying these funds to the rental of otherwise idle land which they tnen put into crop production. They use some of their credit to buy fertilizers, seed etc., sufficient to realize a harvest on these rented lands comparable to the harvest realized on other land but not superior to them. This latter conclusion is based on the evidence from table 21 that crop mix and yield differences did not contribute to credit-farm superiority in total value of output per farm.

Among the larger farms there is a tendency to do slightly more inter-planting on credit farms than on non-credit farms, while multiple cropping differences show no clear trend. Notice that the inter-planting factor shows a positive impact on large farms where the crop mix factor as reported in table 21 shows zero or negative impact. Conversely the crop mix effect is strongly positive on small farms where the inter-planting effect is weak. It should be remembered that the inter-planting

Table 26.—Components of the Difference in Area Between Credit and No-Credit Farms: Regional Averages

(Percentage Superiority of Credit over No-Credit Farms)

Region	Total Cropped Area[1]	Components[2]			
		Size of Farm	Cultivated Area[3]	Multiple Cropping	Inter-planting
Central Highlands	28	18	5	–2	7
South Coast (West)	68	22	35	–19	30
South Coast (East)	22	13	3	1	5
Northeast	45	61	–7	1	–10
Southeast Highlands	25	–6	23	–4	12

[1] These values are transcribed from Table 18 and reflect multiple counting of multiple-cropped land as well as double counting of interplanted land.

[2] These percentages have been adjusted from their raw values so as to sum to the "area" indicators presented in column 1.

[3] These values are net of differences in farm size.

Table 27.—Components of the Difference in Area Between Credit and No-Credit Farms by Region and Farm Size

(Percentage Superiority of Credit over No-Credit Farms)

Region and Farm Size	Total Cropped Area[1]	Components[2]			
		Size of Farm	Cultivated Area[3]	Multiple Cropping	Inter-planting
Central Highlands					
0-1 Ha.	3	10	−1	−1	−5
1-3 Ha.	23	15	21	−8	−5
3-5 Ha.	49	4	25	20	0
5-10 Ha.	21	2	9	3	7
10+ Ha.	−5	−7	−8	−15	25
All Size Average	28	17	7	−1	5
South Coast (West)					
0-1 Ha.*	..	..	..	..	..
1-3 Ha.*	19	−2	16	16	−11
3-5 Ha.*	37	3	48	−25	11
5-10 Ha.*	−1	−21	27	5	−12
10+ Ha.	64	3	50	4	7
All Size Average	68	24	38	−5	12
South Coast (East)					
0-1 Ha.	..	..	..	..	..
1-3 Ha.	13	7	−2	9	−1
3-5 Ha.	47	5	3	26	13
5-10 Ha.	16	7	−10	13	6
10+ Ha.	19	17	2	−4	4
All Size Average	22	13	3	1	5
Northeast					
0-1 Ha.*	−14	−3	−27	22	−6
1-3 Ha.	−6	5	6	−7	−10
3-5 Ha.	2	−1	1	0	2
5-10 Ha.	18	5	20	7	−14
10+ Ha.	31	30	6	9	−14
All Size Average	45	61	−7	1	−10
Southeast Highlands					
0-1 Ha.*	−13	33	−22	28	−52
1-3 Ha.	48	12	−3	29	10
3-5 Ha.	12	0	10	−5	7
5-10 Ha.	27	5	1	6	15
10+ Ha.	8	−2	8	−3	5
All Size Average	25	−6	23	−4	12

[1] These values are transcribed from Table 19 and reflect multiple counting of multiple-cropped land as well as double counting of interplanted land.

[2] These percentages have been adjusted from their raw values so as to sum to the "area" indicators presented in column 1.

[3] These values are net of differences in farm size.

*Unreliable due to small sample size.

index measures *relative* levels of inter-planting on credit and non-credit farms. It is the ratio of the absolute levels which, as is shown in the following pages, often indicate some inter-planting on both credit and non-credit farms. The evidence on relative degrees of inter-planting suggests that cultivating high valued crops is inconsistent with growing crops which are inter-planted. As a farmer dedicates more of his land to high valued crops he uses less of it for growing crops which are customarily inter-planted. Furthermore, we can deduce that credit recipients in the small farm size-classes apparently devote their funds to purchases of inputs necessary to

grow high valued crops while loan recipients on larger farms use their funds to rent land on which to grow traditional crops. In addition the larger farmers do practice a somewhat higher degree of inter-planting than their non-credit counterparts.

3. Components of Gross Area Differences at the Regional Level

Table 26 contains the values of the component indices according to geographic region. Table 27 contains results based on a further disagregation by farm size within the region. In the three areas of interest, the Central Highlands, the Northeast and the Southeast Highlands, the "size of farm" and "cultivated area" components dominate as "explanatory variables". In the Southeast highlands relatively high interplanting on credit farms does play a secondary role in explaining the difference in total area. It is interesting to observe that the pattern of an inverse relationship between growing high-valued crops and interplanting again appears when the data are disaggregated regionally. In the Southeast Highlands (see Table 22) the crop-mix effect is negative while the interplanting component of area difference is positive. In the Northeast the opposite situation holds. The Central Highlands show positive crop-mix and interplanting effects although the crop-mix effect predominates.

To uncover the specific reasons for this apparent inverse relationship as well as for its exception in the Central Highlands, one would have to examine in detail the crops grown in each region. A first step in this direction is to look at Figure 5 where the relative values of crop production due to each crop are presented. These pie charts represent the weighted averages of credit and non-credit farms. They demonstrate considerable differences in the crop composition of each region. One could pursue this further by breaking down these pie charts according to credit type and looking for crops which are known to be high valued versus those which are susceptible to interplanting. Due to constraints on time this additional analysis was not carried out for this report.

Table 28.—Percentage of Land Multiple Cropped and Interplanted on Credit and No-Credit Farms

National Average	Multiple Cropping		Interplanting	
	Credit	Non-Credit	Credit	Non-Credit
National				
0-1	13	11	10	14
1-3	16	12	15	15
3-5	26	5	23	18
5-10	17	10	15	11
10+	5	11	24	14
All Size	9	10	21	14
Central Highlands				
0-1	6	7	11	17
1-3	3	9	10	14
3-5	−2	−15	14	14
5-10	2	−2	23	12
10+	−10	−1	29	12
All Size	−2	−1	19	13
South Coast (West)				
0-1	..	..	..	..
1-3	17	99	0	15
3-5	−13	32	15	0
5-10	44	31	0	12
10+	3	0	44	37
All Size	3	7	40	29
South coast (East)				
0-1	..	.	..	..
1-3	28	19	3	4
3-5	30	4	13	0
5-10	50	33	8	2
10+	41	48	8	3
All Size	42	40	9	3
Northeast				
0-1	28	4	−2	4
1-3	14	22	10	22
3-5	14	14	14	1
5-10	8	1	3	20
10+	2	−9	4	23
All Size	5	4	6	19
Southeast Highlands				
0-1	70	51	0	31
1-3	36	5	29	17
3-5	4	9	39	30
5-10	−11	−16	32	14
10+	−22	−10	36	11
All Size	−9	−4	35	17

E. SOME COMMENTS ON THE ABSOLUTE LEVELS OF MULTIPLE CROPPING AND INTERPLANTING

In the previous section we looked at relative levels of interplanting and multiple cropping as well as the other factors used to explain differences in total area. In Appendix B, Part B, the method for computing these factors or components is presented. In the case of the interplanting and multiple-cropping components, the technique used consists roughly of calculating the percentage of land area which is interplanted on credit farms and dividing it by the same percentage for non-credit. The same procedure is used for multiple cropping,[1] thus one can separate out these percentages

[1]This description is not strictly correct as the division is of two indices rather than of two percentages. This is expalined in Appendix B.

and look at their absolute levels for credit and no-credit farms. These levels are presented in Table 28. The negative values indicate reporting errors on the questionaires. The data were drawn from separate sections of the questionaire and in several cases, notably among the large farms, consistency between the answers was not maintained. Notice that these errors generally occur in pairs on credit and no-credit farms of the same size class. Thus the distortion of the percentage changes reported above will be relatively slight.

Looking at the results, a few patterns emerge. There appears to be a considerable amount of multiple cropping on small farms of both groups in the three target regions, the Central Highlands, Northeast and Southeast Highlands. Note that in the Central Highlands the degree of multiple cropping is relatively slight (6 to 9 percent of cropland) while it is truly dramatic on the small farms in the Southeast Highlands (36 to 70 percent). In the South Coast (West) there is a pocket of high multiple cropping among the mid-size farms while in the South Coast (East) farms of all sizes seem to show a high degree of multiple cropping.

Interplanting is high on all farms (10 to 30 percent of cropland - adjusted for multiple cropping) in two of the three target regions. These are the Central Highlands and the Southeast Highlands. In the third target region, the Northeast, interplanting is significant on farms of all sizes among the non-credit group but significant only among small farms (0-3 Ha.) in the credit group. The South Coast (East) shows uniformly low rates of interplanting while the South Coast (West) demonstrates quite high (37 to 44 percent) interplanting on the large farms.

It appears that the amount of interplanting and multiple cropping is mostly closely associated with region and to a lesser extent farm size. Credit is a relatively minor determinant of these cropping practices. Because credit appears to have little relationship with interplanting and double cropping, we may conclude that credit cannot be used to induce more of these activities. On the other hand, it would perhaps be wise to direct credit to those areas and farm size groups where interplanting and double cropping are already high. Presumably this would encourage cultivation techniques which are land intensive. Given the overall scarcity of land in Guatemala, such techniques should be fostered if the objective of maximizing food output is to be met on the limited land base.

F. OUTPUT-CAPITAL PRODUCTIVITY

1. Guatemala's Relative Scarcity of Credit

Figure 8 presents credit availability comparisons with other Latin American countries for the year 1968. Guatemala appears by Latin American standards to be particularly unendowed with credit resources. This credit scarcity makes it all the more important that the limited amounts be directed with careful attention to their output, income and employment productivity.

2. Capital Productivity Performnce

Figure 9 presents the output-capital productivity of the credit and no-credit farms by size of holding.

There is no obvious trend of capital productivity by farm size inside the two general size classes, but the difference between the large and small farms as groups is significant. For both of the groups the no-credit farms have higher output per Q of capital. This would lead us to hypothesize that added credit to farms of most size groups, except the smallest, will yield less output per unit than the farm's current average. In order to investigate the relationship of added credit availability and the apparent decline of capital output productivity, Table 21 and Figure 9 present the capital productivity by levels of credit used for the two overall farm size groupings.

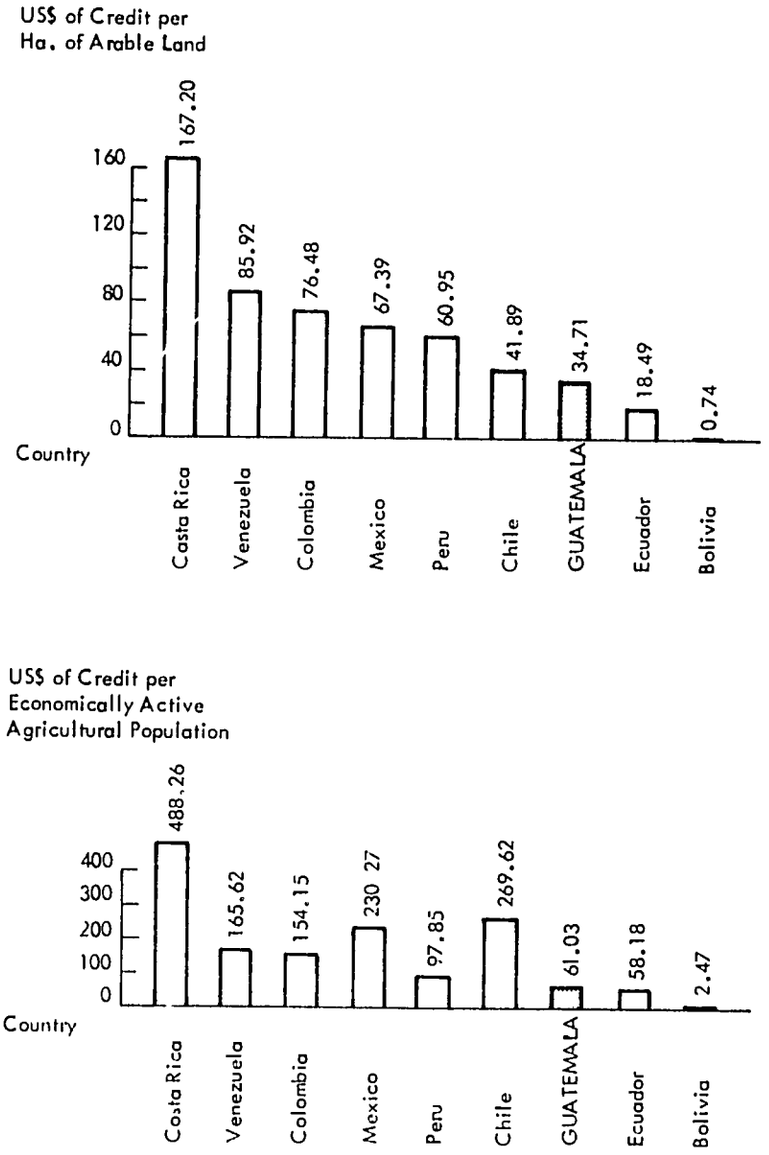
Table 29.—Capital-Output Productivity By Level of Credit Used and Farm Size

Farm Size and Q of Credit Used Groups	Q of Output per Q of Capital Value	Average Size of loan in Q
Small Farms		
Q 0-250	.37	160
Q 250-350	.35	290
Q 350-500	.37	402
Q 500 +	.42	937
Large Farms		
Q 0-500	.23	298
Q 500-1000	.25	660
Q 1000-5000	.30	1708

3. International Comparisons

In order to assess the capital absorbtion capacity of Guatemalan farms it is helpful to have some comparisons with other countries. These comparisons, as presented in Table 30 and Figure 10, include capital endowment and

Figure 8.–Credit Availability per Agricultural Worker and per Arable Hectare



capital output productivities. The international figures available were with reference to arable hectares so the Guatemala figures are given in comparable terms. From Table 30 and Figure 10, three major conclusions can be drawn:

1. The capital endowment of the small Guatemalan farms is surprisingly high when compared with a variety of capital rich countries.
2. There is no obvious decline in the productivity of capital over the very wide range in capital endowments sampled.
3. Almost all Guatemalan output-capital productivity ratios are markedly superior to the other countries.

We are reminded again by this table of the glaring fact that *the principal explanation for the abject poverty level of the Guatemalan small farmer is the absolute size of his operation and not the efficiency of his processes.* It is surprising indeed that almost all Guatemalan farmers have significantly higher capital productivities than the U.S. average. A possible explanation for this surprising finding might be that they are working at such low capital intensities that the output/capital ratio is

Figure 9.—Capital Output Productivity and Capital Endowment per Hectare by Farm Size and Credit Type

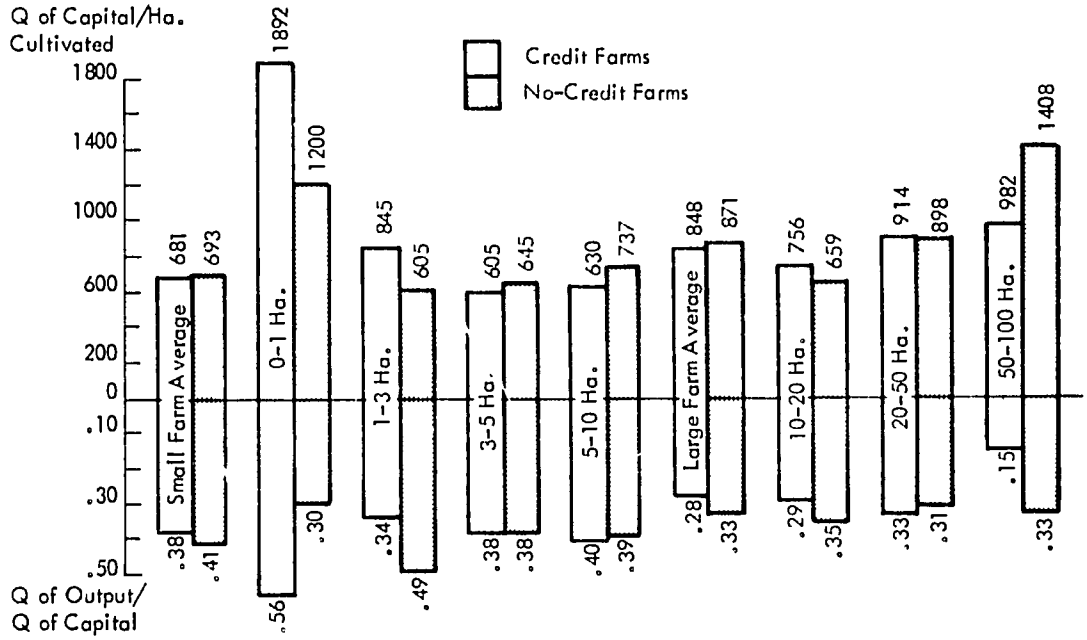


Figure 10.—International Comparisons of Capital and Capital Produotivity

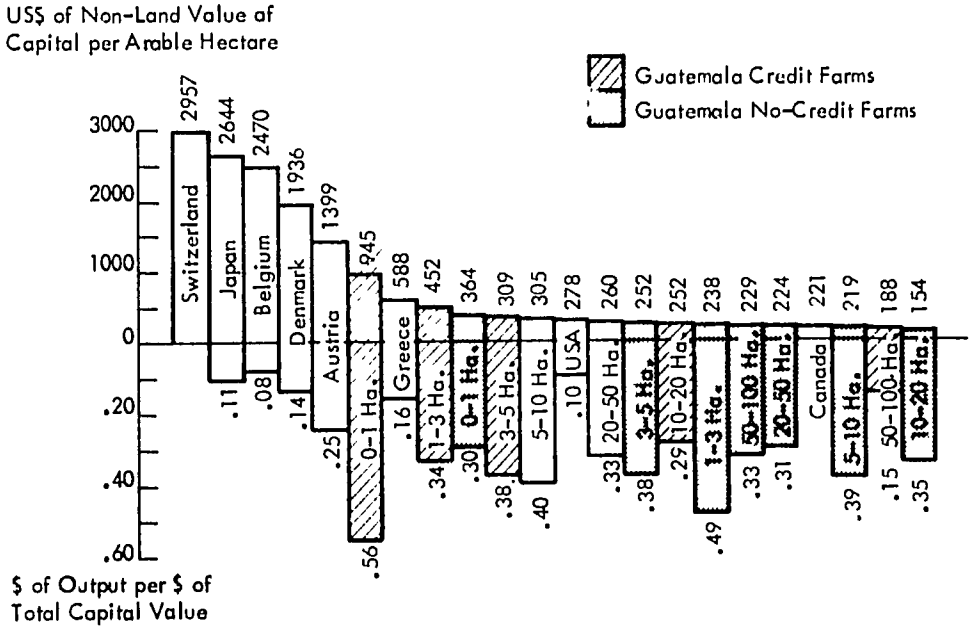


Table 30.—International Comparisons of Capital Endowment and Capital Productivity

Country	U.S. $ of Non-Land Value of Capital Per Arable Hectare*	Index of Capital Endowment Guatemala = 100 ($337/Ha.)**	$ of Output Per $ of Total Capital Value
Switzerland	2957	877	n.a.
Japan	2644	785	.11
Belgium	2470	733	.08
Denmark	1936	574	.14
Austria	1399	415	.25
Guatemala			
Credit Farms (0-1 Ha.)	945	280	.56
Greece	588	174	.16
Guatemala			
Credit 1-3 Ha.	452	134	.34
No-Credit 0-1 Ha.	364	108	.30
Credit 3-5 Ha.	309	92	.38
Credit 5-10 Ha.	305	91	.40
United States	278	82	.10
Guatemala			
Credit 20-50 Ha.	260	77	.33
No-Credit 3-5 Ha.	252	75	.38
Credit 10-20 Ha.	252	75	.29
No-Credit 1-3 Ha.	238	71	.49
No-Credit 50-100 Ha.	229	68	.33
No-Credit 20-50 Ha.	224	66	.31
Canada	221	66	n.a.
Guatemala			
No-Credit 5-10 Ha.	219	65	.39
Credit 50-100 Ha.	188	56	.15
No-Credit 10-20 Ha.	154	46	.35

* Guatemala figures are in the US$ for 1973. Other countries are for earlier years inflated assuming US$(1968) x 1.31 = US$(1973)

** The Guatemala average is for all small credit farms 0-10 Hectare. Sources are from various government documents filed with the OECD. Basic data came from the cited government source, but the author is responsible for interpretation and calculation of these coefficients.

Switzerland. *National Survey of Book-keeping Farms 1967*

Japan. *Farm Household Economy Survey 1966* and data from Nippon Research Institute on Real Estate

Belgium: *Survey of Professional Farms Including Horticulture 1967*

Denmark: *Survey of Book-keeping Farms by Detlandkomiske Driftsbureau 1967*

Austria: *National Survey of Book-keeping Farms 1967*

Greece. *National Accounts of Greece 1967*

United States. *1968 National Balance Sheet of Agriculture USDA* (for all farms with annual sales over US$2,500)

Canada: *1966 National Census of Commercial Farms*

understandably high, and that with additional capital the ratio will decline quickly; that because Guatemalan technology is less efficient, when the capital intensity reached the U.S. levels the Guatemalan capital productivity would be lower. This sometimes proffered hypothesis appears to be directly contradicted by the data, since the Guatemalan farms with the highest intensities (as much as 3 times U.S. intensities) also have the highest capital output productivities ranging up to 5-1/2 times the U.S. average level. Table 31 summarizes the U.S. and Guatemalan figures.

Comparisons with the U.S. are particularly appropriate since the average crop mix of the farmers in our Guatemalan sample is not much different than the

average U.S. farmer. The Swiss, Danish and Japanese farmers have a more intensive average crop mix and might more appropriately be compared to Colombia. The wheat and corn focus of the Guatemala sample and its comparability with the cereals - livestock agriculture of the U.S. is a symptom of one of Guatemala's critical problems. While Guatemala has very high labor and moderately high capital endowments per arable ha., when compared with intensive agriculture countries, it has chosen a crop mix characteristic of the extensive agriculture countries. For the small farmer whose labor and capital endowments per arable hectare are the highest, this crop mix can only lead to continuing poverty.

Table 31.—Comparison of Capital Intensity on Arable Land and Output-Capital Productivities for the Country Average and Guatemalan Farm-Size Groupings

Country and Farm Size	Index of Capital Intensity on Arable Land $ Capital/ Arable Ha. U.S. Ave. = 100	Index of Output-Capital Productivity $ Output/$ Capital U.S. Ave. = 100
(Ranked on Output-Capital Productivity Index)		
Guatemala		
Credit 0-1 Ha.	340	560
No-Credit 1-3 Ha.	86	490
Credit 5-10 Ha.	110	400
No-Credit 5-10 Ha.	79	390
Credit 3-5 Ha.	111	380
No-Credit 3-5 Ha.	91	380
No-Credit 10-20 Ha.	55	350
Credit 1-3 Ha.	163	340
Credit 20-50 Ha.	94	330
No-Credit 50-100 Ha.	82	330
No-Credit 20-50 Ha.	81	310
No-Credit 0-1 Ha.	131	300
Credit 10-20 Ha.	91	290
Credit 50-100 Ha.	68	150
United States	100	100

CHAPTER SIX: THE IMPACT OF CREDIT ON NET FARMER INCOME

A. THE ISSUE OF RURAL POVERTY

In this chapter credit impact will be discussed in per capita terms. Poverty is the critical issue here and our concern with minimal living standards and nutrition suggests that measurements be on a per person basis. The absolute levels of poverty as we shall see in this section are much more disappointing than the per hectare or per Q of capital measures. It is the absolute income per person which is acceptable and whose increase is the real focus of the government programs.

1. The Severity of the Problem in the Central Highlands

In addition to the per person focus of our examination of the net income question is the regional nature of poverty. The Central Highlands region is the locus of the most severe poverty, net income per adult family laborer ia Q117*. The South Coast Regions (East and West) are regions of considerably higher incomes while the Southeast Highlands and the Northeast represent intermediate and mixed income levels. In this section then we will segment our discussion and statistical presentation into these three geographical groupings. Considerable attention will be given to the problem of the Central Highlands and the potential of credit for making significant inroads on the severe income situation there.

Since the Central Highlands is the area with the most severe problems of low per-capita income levels, we will review it first in Table 32. Table 32 is among the most important we shall present because it focuses directly on the question of the adequacy of net income and the impact of credit on the income position of the small farmers in the lowest income region. Table 33 addresses the question of the amount of improvement which the credit farmers experienced in per laborer net income. It presents the percentage differences between the credit and no-credit farm data shown in Table 32.

*Net Farmer Income includes value of home consumed production and subtracts out-implicit costs or returns to land and capital. See Appendix A: Notes on the Calculation of Net Income.

Table 32.–Net Income Per Family Laborer On Small Farms In The Central Highlands By Farm Size And Credit Type.

Farm Size	Credit Farms	No-Credit Farms
0-1 Ha.	324	75
1-3 Ha.	124	124
3-5 Ha.	105	–26*
5-10 Ha.	147	137
Average for all small farms 0-10 Ha.	140	86

*This indicates a slightly negative net income, for explanation See Appendix A: Notes on calculation of net income.

2. Comparisons With Other Regions and Conclusions: Impact of Credit

The findings in Table 33 hold considerable short run hope for making an important improvement in the net real welfare of the small farmer in the Central Highlands. Similar comparisons for the two South Coast regions (see Table 35) indicate almost the opposite where small credit farms do generally worse than the no-credit control group farmers on net income per family laborer. As noted in Table 34, the South Coast tends to be an area of significantly higher net income levels and should not be the focus of programs to assist the lowest income strata of farmers. It is an interesting coincidence that the farmers who need the least assistance are also those who are apparently unable to make significant advances when credit is extended. This is a curious situation in which

Table 33.–Net Real Income Per Family Laborer on Small Credit Farms as a Percent of Comparable No-Credit Farms For the Central Highlands Region, by Farm Size

Farm Size	Credit Farms As % Of No-Credit Farms (No-Credit = 100)
0-1 Ha.	432
1-3 Ha.	100
3-5 Ha.	504
5-10 Ha.	107
All Small Farms	163

Table 34.–Net Farm Income Per Family Laborer By Farm Size and Region[1]

	Central Highlands	South Coast (West)	South Coast (East)	Northeast	Southeast Highlands
All Farm Sizes	100	714	863	487	658
Small Farms					
0-1 Ha.	119	na	na	382*	na
1-3 Ha.	131	137*	317	596	173
3-5 Ha.	47	255*	513	599	463
5-10 Ha.	156	1067*	950	633	540
All Small Farms	117	402	622	595	379
All Large Farms	–64	946	1276	194	*291

[1]Credit and no credit farms are summed together. n.a. indicates data are unreliable due to small sample size.

*Unreliable due to small sample size.

those who are lowest on the income scale are also those who can make the largest advances when given assistance. This rather encouraging pattern continues in the other two regions where farm incomes are lower than the South Coast but significantly higher than the Central Highlands. Table 35 presents the same index of net income superiority of the credit farms over the no-credit control group.

Table 35.–Index of net Real Income per Family Laborer Inferiority of Credit Farms in the two South Coast Regions by Farm Size

	Credit as % of No-Credit	
Farm Size	South Coast (West	South Coast (East)
All Small Farms	59%	91%
0-1 Ha.	na	na
1-3 Ha.	631%*(Exception)	45%
3-5 Ha.	71%*	78%
5-10 Ha.	40%*	81%

*Unreliable due to small sample size.

It would appear from Tables 32 and 36 that the impact of credit on farmer net income per capita is very positive in the three poorest regions and negative in the two highest income regions. This would indicate a strong policy preference toward concentrating public credit which is focused on solving the net income component of rural poverty in the three indicated regions (Central Highlands, Northeast and Southeast Highlands). The fact that net incomes per person are in some cases four and five times higher with credit indicates some guarded optimism about the short run potential of credit for making significant inroads into the poverty situation.

Table 36.–Index of Net Real Income Superiority of Credit Farms in the Northeast and Southeast Highlands Regions

No-Credit Farm Net Income per Family Laboer = 100		
Farm Size	Northeast	Southeast Highlands
0-1 Ha.*	353	344
1-3 Ha.	146	na
3-5 Ha.	90 (exception)	146
5-10 Ha.	144	175
All Small Farms	134	110

*Unreliable due to small sample size.

B. CREDIT ASSOCIATED CHANGES IN THE NET INCOME PRODUCTIVITY OF LAND AND CAPITAL

1. Land and Capital Summary

The objective of the discussion and statistical presentation in this section is to identify how net income efficiency or profitability was affected by credit. Income per unit of land and per unit of capital will be examined. Per person net income could have risen if the efficiency of land and capital decreased, and it might have been achieved in a way that is inconsistent with the scarce nature of land and capital in Guatemala. For example, the net incomes of persons on credit farms may have risen even though production processes they

were using were less efficient in generating net income per arable hectare or per Q of capital than the no-credit farms. This would happen if the credit farmers used highly capital intensive and/or land extensive cultivation techniques, such as those that characterize U.S. agriculture, while not raising output proportionately.

The credit farms in these regions appear to have achieved markedly superior efficiency in net income generation from their arable land resources. In only three of eleven categories were the no-credit farms superior, and then the margins of no credit superiority are much lower than the margins in the eight cases of credit farm superiority.

On balance it appears that in the three poorest regions, credit has had a significant impact on the net income per person and the efficiency of land and capital use in generating net imcome. (See Table 37) In the South Coast regions the opposite appears to be the case; both capital and land produce less net income per unit on the credit farms than on those without institutional credit. While the comparative indices of Table 37 are useful in assessing the impact of credit on capital and land net income productivities, tha absolute productivity ratios are important to examine for indications they give as to the net income potential of arable land and the profitability levels or net capital returns.

2. Net-Income Productivity of Capital

Table 38 presents the capital net income productivities for all of the regions and small farm size groupings. The measure indicated in Table 38 is a particularly important absolute measure because it not only idicates the farmer net income benefits which flow from capital use, but also indicates the financial profitability of the production processes. As a financial profitability measure it is an indicator of the "bankability" of each farm enterprise. It should be remembered that this calculation is difficult to compare with other net income productivity measures fo capital since it already subtracts out return to the largest single capital good, land. On the other hand, it leaves in returns to unpaid labor.

In attempting to make international comparisons on this measure, I was only able to find data which allowed comparable figures for the United States. By subtracting a 10% return to land but including the returns to labor and management, the net return per $ of capital used in agriculture for the U.S. in 1968 was .026[1]. By that standard all of the farm groups in Guatemala make more

[1]Author's calculation based on *1968 Balance Sheet of Agriculture* (for all farms with annual sales over $2,500), U.S. Department of Agriculture, 1969, Washington, D.C.

Table 37.—Indices of Comparative Performance of Credit and No-Credit Farms on Land and Capital Net-Income Productivity, By Farm Size for the Three Poorest Regions

Region and Farm Size	Net Income/ Arable Hectare	Net Income/ Q of Capital[1]
	Credit Farm Performance as % of No-Credit Performance	
	(Parentheses Denote Cases where No-Credit are Superior)	
Central Highlands		
0-1 Ha.	299	256
1-3 Ha.	(64)	(70)
3-5 Ha.	456	500
5-10 Ha.	(75)	125
Northeast		
0-1 Ha.	454*	155*
1-3 Ha.	138	(72)
3-5 Ha.	(75)	(59)
5-10 Ha.	162	120
Southeast Highlands		
0-1 Ha.	219*	202*
1-3 Ha.	na	na
3-5 Ha.	113	112
5-10 Ha.	149	138

[1]Capital including land value for which the sample estimates are probably not very accurate. This ratio should be interpreted in that light.

*Unreliable due to small sample size.

Table 38.–Net Income-Capital Productivity by Region, Credit Type and Farm Size

	Q of Net Income per Q of Capital				
Farm Size & Credit Type	Central Highlands	South Coast (West)	South Coast (East)	Northeast	Southeast Highlands
All Small Farms					
Credit	.07	.17	.19	.25	.18
No-Credit	.05	.33	.46	.32	.24
0-1 Ha.					
Credit	.23	na	na	.59	1.09
No-Credit	.09	.17	.53	.38	.54
1-3 Ha.					
Credit	.07	.25	.14	.36	na
No-Credit	.10	.12	.39	.50	.37
3-5 Ha.					
Credit	.04	.16	.21	.20	.28
No-Credit	–.01	.11	.42	.34	.25
5-10 Ha.					
Credit	.05	.12	.19	.18	.22
No-Credit	.04	.47	.50	.15	.16
large Farms					
Credit	–.03	.14	.12	.02	.10
No-Credit	–.01	.17	.15	.01	.19

profits per capital unit than do average U.S. farmers When we realize that 10% has already been subtracted out for land, as well as actual interest costs on borrowed money, it would appear that almost all of the production processes here represented by credit and no-credit farmers are commercially bankable. Small farm production processes appear to be financially profitable but it does not follow that they are also always "secure" from a banker's point of view, since profitability is a per unit measure and borrower default may still be a troublesome problem. Default could be caused by the small absolute size of farm incomes and the inability to withhold from consumption the funds necessary to repay the loan. Alternatively the borrower might refuse to repay knowing that sanctions against him may be slight. Since both of these factors may in fact be very strong, it is difficult to say that the repayment process would be secure, all that can be said is that the financial profitability on a per unit basis is good. It should be remembered that the per-unit return is a measure of efficiency, not wealth, and though the Guatemalan small farmers use capital more efficiently and even have more of it per hectare, the overwhelming differences in the absolute size of the American farm account for the superior absolute wealth and annual net income of American farmers.

3. Net Income Productivity of Arable Land

Table 39 and Figure 11 present the net income productivity of arable land for each of the regions and farm sizes. (The comparative s anding of the credit farms in the three poorest regions has been presented in Table 37.)

4. Crop Mix and Income Productivity

Noting the unusually high levels of net income per arable hectare in the Northeast reminds us of the important consideration of crop mix. If we repeat a portion of Figure 5 on crop mix and then add the gross output and net income per hectare for each of the three regions where we have determined that credit has had a significant impact and hence an attractive future, we see the influence of crop mix. This calculation is made in Table 40.

We have reviewed the farm income of rural Guatemalans in an effort to understand the current status and potential of the farm activities to provide acceptable income levels. The evidence indicates that in a large number of cases, in the poorest regions, potential exists to double and in some cases triple income levels with credit.

Table 39.—Net Income Productivity of Arable Land by Region, Farm Size and Credit Type (Q per Hectare)

Farm Size & Credit Type	Central Highlands	South Coast (West)	South Coast (East)	Northeast	Southeast Highlands
0-1 Ha.					
Credit	515	na	na	1536	423*
No-Credit	172	292*	380*	344	193*
1-3 Ha.					
Credit	89	189*	105	463	na
No-Credit	139	39*	249	366	194
3-5 Ha.					
Credit	46	78*	171	185	158
No-Credit	−16	152*	212	247	140
5-10 Ha.					
Credit	41	58*	146	165	150
No-Credit	55	171*	300	102	101

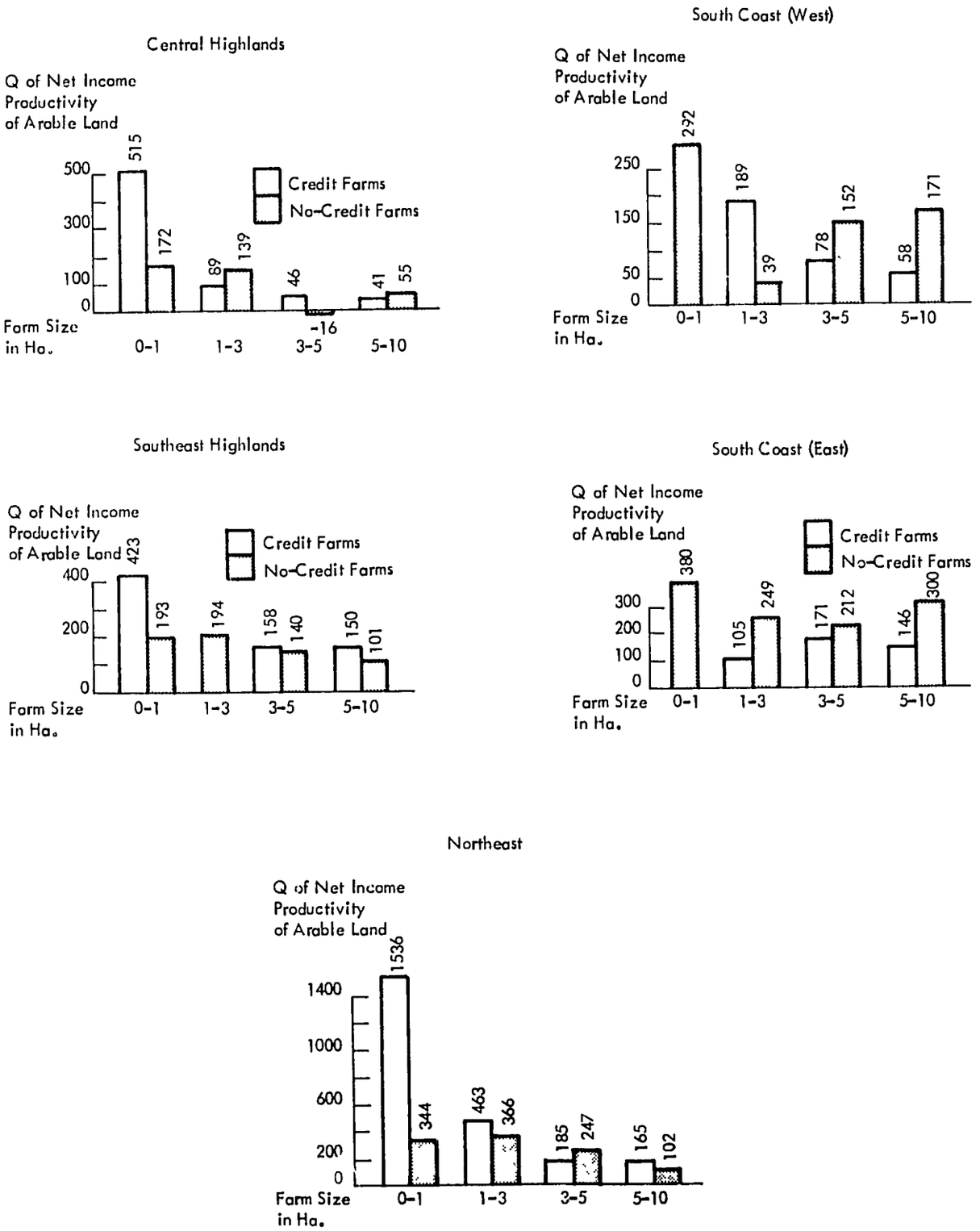
*Unreliable due to sample size.

Table 40.—Comparisons of Regional Differences in Crop Mix, Net Income and Gross Output per Hectare

	Central Highlands		Northeast		Southeast Highlands	
Crop Importance in the region: % of total value of production.	Wheat	32.8%	Corn	26.2%	Corn	18.9%
	Corn	22.7%	Tomatoes	24.3%	Milpa	13.5%
	*Milpa	13.1%	Potatoes	7.1%	Rice	10.9%
	Garlic	7.1%	Milpa	6.7%	Onions	10.4%
	Potatoes	4.0%	Onions	6.4%	Beans	8.9%
	Beans	1.6%	Rice	6.2%	Sorghum	6.2%
Q of Output per Hectare Cultivated	269		408		227	
Q of Output per Hectare Cultivated as % of Northeast	66%		100%		56%	
Q of Net Income per Hectare Cultivated	73		212		108	
Q of Net Income per H Hectare Cultivated as % of Northeast	34%		100%		51%	

*Corn & Beans inter-cropped.

Figure 11.—Net Income Productivity of Arable Land by Region, Farm Size and Credit Type



C. Non Farm Supplement Income

Figure 12 presents the farm and off-farm income pattern by farm size and credit type for the three priority focus regions. The Guatemalan farmer with less than one ha., unlike the Colombian farmer of similar size who makes 80% of his income from off-farm sources, depends principally on his farm for his income. On a regional basis, it appears that the Central Highlands farmers (the poorest) have the largest dependance on off-farm income sources, mostly from migratory labor to the South Coast. It would appear that in most of the cases the credit farmer depends less on off-farm income, and perhaps due to his increased labor demand from expanded cultivation, is able to absorb more of his family labor at home. It is interesting to note that in the Central Highlands the dependence on off-farm income as a percent grows as farm size increases. The credit farms widen their net income superiority when off-farm income is added since they tend to have larger off-farm incomes per family laborer. This superiority is true for all of the three regions for farms with sizes up to 5 hectares, but it is dramatically reversed in all of the regions for the 5-10 hectare farms where the no-credit farms have as much as six times as high off-farm income per person. Without more detailed data we are unable to explain this consistent reversal of off-farm income patterns of credit and no-credit farms. It is difficult to explain why the credit farms from 1-5 hectares have such consistently higher off-farm income per person than the no credit control group. This conclusion seems to contradict our earlier suggestion that the lowered dependence of the credit farm on off-farm income sources is explainable by using more of their labor at home. It appears that this decreasing percentage reliance on off-farm income is not an indication of decreased off-farm income but rather a confusing result caused by the significantly higher total income caused by farm income which therefore reduces the percent share of the off-farm income. Added disaggregation of the farm income category will be required before significant analysis of this topic can be made.

Figure 12.–Farm and Off-Farm Net Income by Farm Size, Region and Credit Type

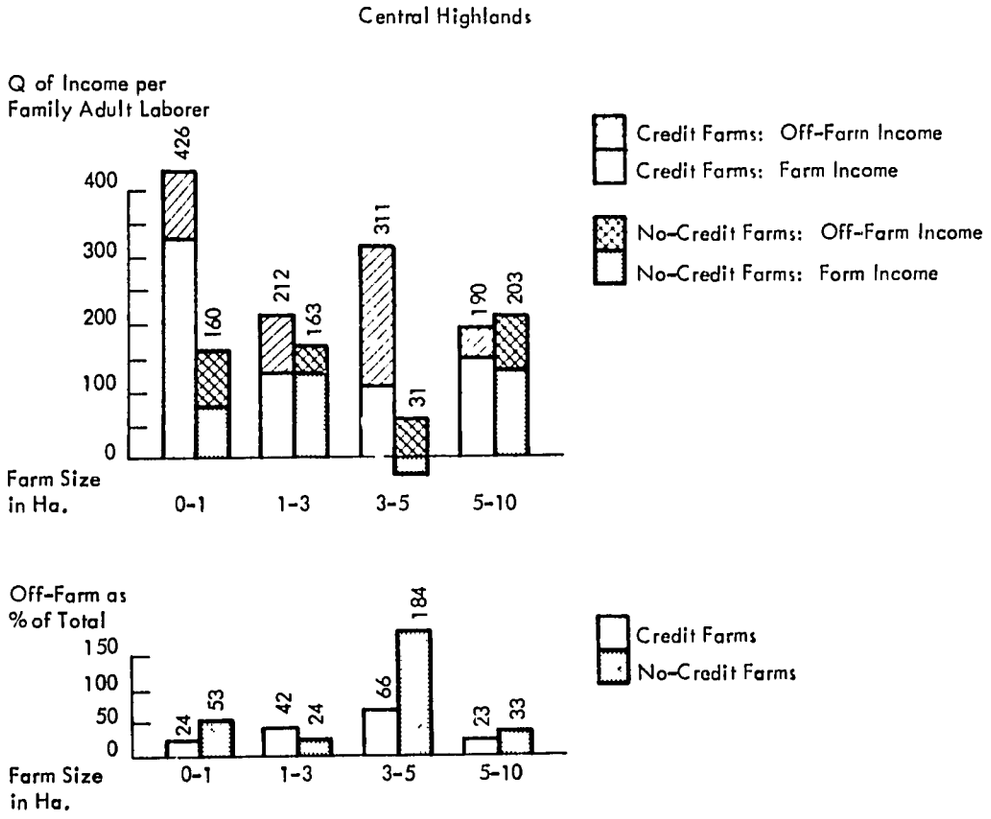
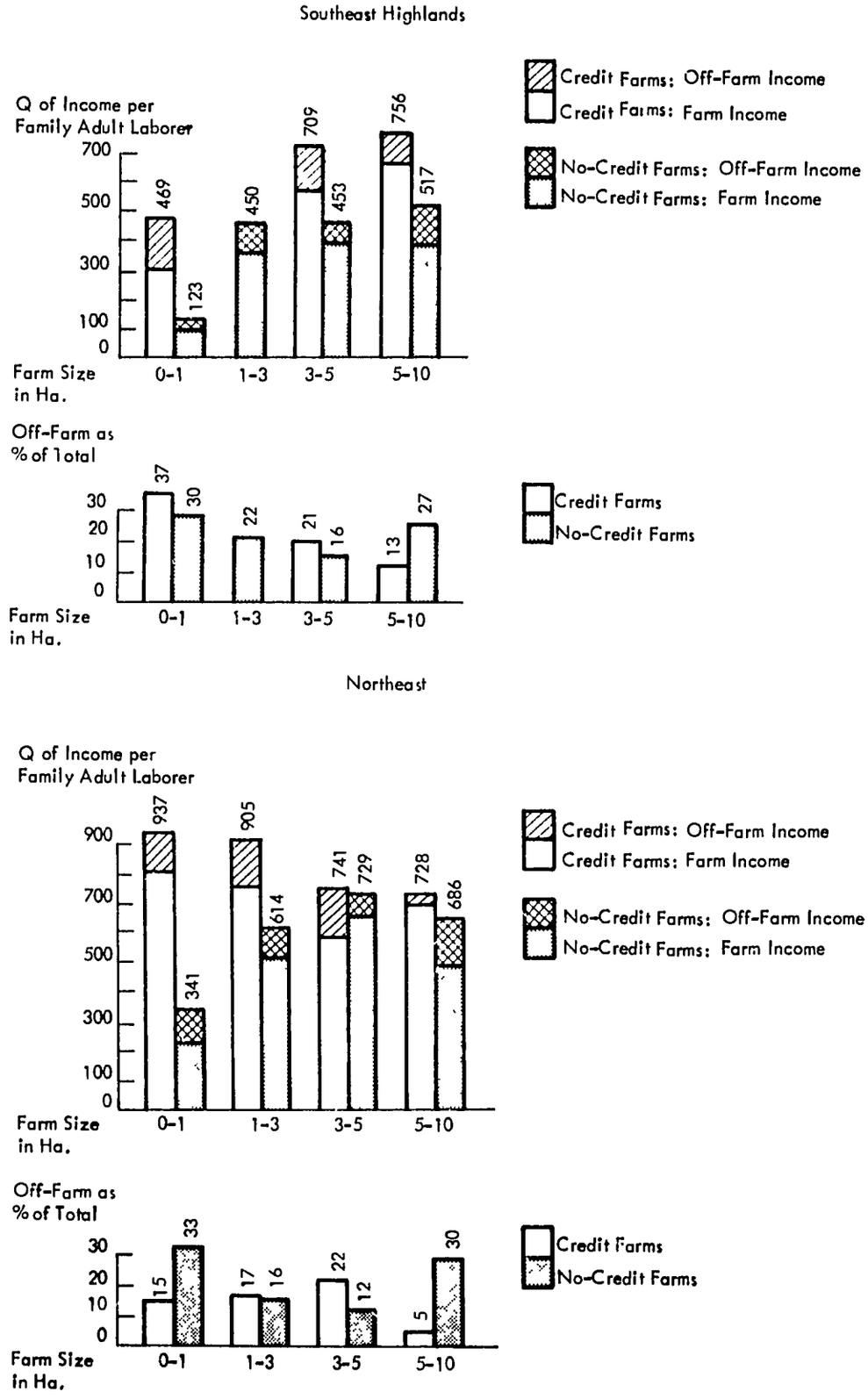


Figure 12.–Farm and Off-Farm Net Income by Farm Size, Region and Credit Type–Cont'd.



CHAPTER SEVEN: THE IMPACT OF CREDIT ON RURAL EMPLOYMENT

A. REASONS FOR TREATING EMPLOYMENT AS A SEPARATE ISSUE

1. Three Goals Behind the Employment Objective

Guatemala suffers from a high rate of under and unemployment in agriculture. Because this problem is so severe and because methods for reducing it may be in conflict with the policies designed to raise output or income, employment creation is studied as a separate issue.

Three sub-objectives lie behind the employment objective:

1) Achieving a more equitable income distribution.
2) Stemming the tide of rural-urban migration.
3) Raising the sense of well-being and self-esteem of the rural dweller.

2. Problems in Analyzing Employment

Employment presents analytical problems unlike any of our other objectives since labor is at once a means, one of the inputs into the process, and a principal end. Of all the disimilarities between United States and Guatemalan agriculture none is so striking as the price of labor. This price is of course a reflection of the relative abundance of labor at hand compared to land and capital. Labor's role as a input and labor's role as a beneficiary of the process create confusion and make the analytical process more difficult. When a particular factor of production is scarce, we would expect that factor to be priced high and mixed sparingly with the other factors in order to achieve maximum production. One of the frustrations of development in a country like Guatemala is that while we cannot deny the obvious abundance of labor, we hesitate to think of the human factor as being cheap. We constantly search for production alternatives which will improve the lot of labor but in so doing, interpret improvements to be those alternatives which mix more capital or capital purchased inputs with each unit of labor. In effect, we press towards alternatives which will give labor more output per unit or person. The nature of mixing scarce and abundant resources implies that if we begin to treat labor as if it were scarce, that is, attempting to mix *more* of the other factors per unit of labor, and, if the other factors exist in limited supply, the inevitable result will be less employment.

The problem lies in equating value with scarcity. They need not be the same. People may be very valuable in human terms even if they are not scarce, and to treat the labor factor as if it ought to be high priced even though it is not scarce leads to less welfare and not more. To select processes which use less labor and more of the other scarcer factors in the hope that they will produce more welfare for laborers is a costly error. It is one often committed when agricultural "modernization" is artificially forced.

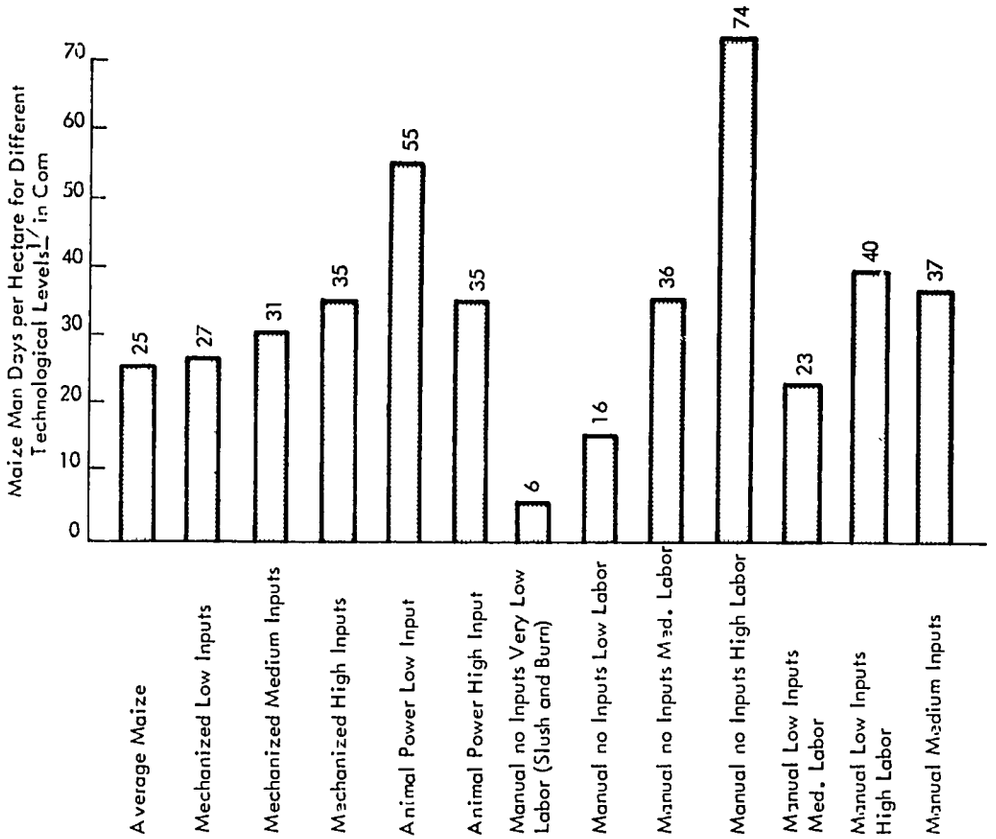
As a general rule there is more margin for altering factor proportions between crops than inside them. That is to say that it is easier to change the proportion of capital that is used per laborer in a farm by altering the kind of crops that are grown, or the proportion of the crops grown, than it is to change the factor proportions of each crop but keep the crops and crop mix the same. This may be illustrated by the case of corn and other crops in Colombia as presented in Figure 13. While corn (Fig. 13) can be efficiently grown with amounts of labor varying from 23 to 74 man days per hectare, that within-crop range is dwarfed by the between-crop ranges in Figure 13. Crop mix is perhaps even more important for the employment objective than we have observed for the output and income objectives.

3. The Prevalence of Widespread Unemployment Even at Very Low Wage Rates

It is important to point out that the most serious income gap is between the poorly paid but fully employed worker and the unemployed worker rather than between the fully employed, poorly paid Guatemalan worker and the higher paid worker. If a Guatemalan could make 15 cents per hour, eight hours per day, 300 days per year, that would provide him with a net income better than the majority of the farm owner/operator classes. To have every rural person between 12-64 earning a minimum of 15 cents per hour for all of their employable hours would be a human welfare accomplishment of dramatic proportions. The search for production alternatives which can absorb large

Figure 13.–Labor Intensity by Technological Level: Corn

(Colombia, 1969)



amounts of labor at between 20-35 cents per hour and be financially profitable and productive is the essence of the near term task for Guatemala. Not only on the income side would such an accomplishment be impressive but the production impacts would likewise be substantial.

B. THE IMPACT OF CREDIT ON EMPLOYMENT AT THE FARM LEVEL

1. Labor-Land Utilization Rates

The availability and use of labor in Guatemalan agriculture, is presented in summary in Tables 41 and 42 and Figure 14. These tables relate employment levels to credit use on farms of different sizes. Three important conclusions can be drawn from Tables 41 & 42:

1. Credit appears to have a positive impact on labor utilization per arable hectare. All credit farms are more labor intensive than the comparable no credit farms, though the differences are not large except for the small farms.

2. Labor intensity decreases steadily and substantially as farm size increases for both credit and no credit farms. The smallest farms are the best employment generators and the differences are very large, the smallest farms employ almost seven times as much labor per arable hectare as the average large farm.

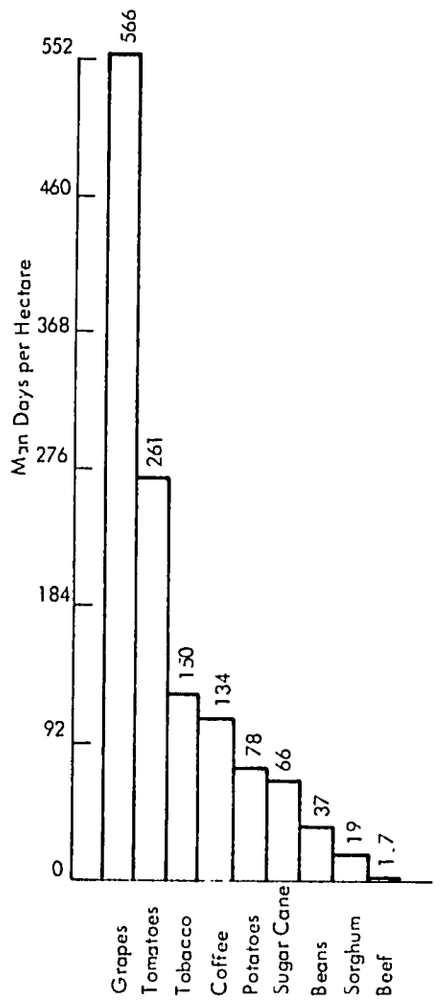
3. As demonstrated in Table 42 none of the farms, even the smallest, are very intensive in an absolute sense. The crop mix of even the smallest does not require enough labor to generate the necessary efficient employment to absorb the farm labor supply.

2. Comparative Capital Intensities Necessary to Achieve Full Employment

Table 43 and Figure 15 document the amount of capital per worker which would be required to achieve

Figure 13.–Land Labor Intensity (Selected Crops)–Cont'd.

(Colombia, 1969)



full employment assuming that the present crop mix and technologies were maintained. Where capital is scarce it would be hoped that efficient economic processes are available which mix large amounts of labor with little capital and yet produce high output and income per available laborer. Thus low values for the ratios presented in Table 43 are preferable to high values, in a capital scarce economy. Table 43 indicates that the capital cost of providing workplaces in Guatemalan agriculture varies within a comparatively large range. There is some empirical support for the idea that the lowest capital cost of providing workplaces is in the fruit and vegetable crops. This trend was observed to be vital in the case of Colombia. Table 44 and Figure 16 compare the capital costs of providing workplaces in Guatemala with selected countries from the developed world. Two concepts are presented, the capital costs of non-land capital and the capital costs including land. If a policy were to be aimed at reordering the ownership patterns of land and the financing of the land part of the program were to be included then the larger cost figure is the one that should be used in computing the costs of creating new workplaces. If expansion is expected to be possible without reordering the ownership patterns then the employment generation process will be consequently cheaper. In addition to the capital/man day utilized measure, in the Guatemala case we also include in Table 44 estimates of the incremental capital (credit) cost of generating employment. This computation is based on the observation that the credit farms almost universally use more labor than the no credit farms. If we divide the added labor by the added credit we derive an incremental capital labor ratio which might be thought of as the cost of providing added employment.

3. Capital Costs in Selected Countries

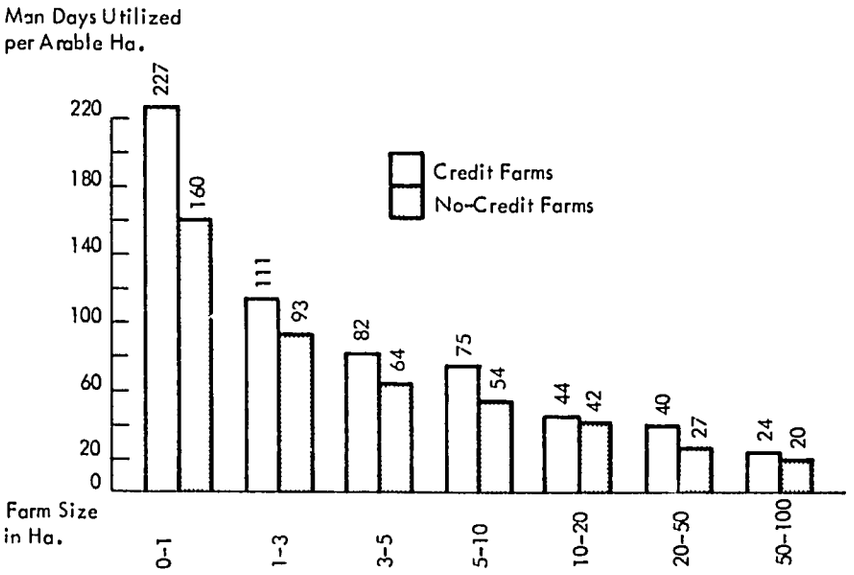
From Table 44 it can be observed that the Guatemala capital costs of providing one workplace in agriculture are very low by international standards. Table 47, in the following section, indicates employment rates for the different farm sizes and regions. From these Tables it is apparent that the employment rate is so varied from region to region that only a very rough estimate might be given. We estimate the average employment rate to be about 52%, the capital availability per agricultural laborer to be between U.S.$150-1000 for non-land capital and between U.S.$500-2500 for total value of capital including land. It follows from these estimates that *if Guatemala wishes to reach full employment it must either roughly double the amount of capital it has available, or reduce by 1/2 the capital cost of providing a workplace.* When the problem is put in those terms, it focuses our attention on the importance of the differences between the capital costs of providing workplaces as observed in the different regions. Reviewing again Table 44 and keeping in mind the number of farms in each of the categories, I would make a rough estimate that the current average capital cost of a workplace for all farms in Guatemala is probably only slightly above U.S.$1000. THe question we ask when we face the capital side of the employment problem is two fold:

1. What potential exists for obtaining the necessary additional capital to absorb the unutilized labor productively?
2. What potential exists for lowering the average

Table 41.—Labor Utilization on Small Farms

	Man Days Utilized/Arable Ha.			
	Man Days Utilized per Ha. Cultivated	Number	Credit as % of No-Credit	Man Days Available per Arable Ha.
Small Farms				
0-1 Ha.	141	172	142	594
Credit	199	227		
No-Credit	128	160		
1-3 Ha.	77	102	120	205
Credit	80	111		
No-Credit	72	93		
3-5 Ha.	61	74	128	109
Credit	63	82		
No-Credit	58	64		
5-10 Ha.	59	66	139	70
Credit	62	75		
No-Credit	53	54		

Figure 14.—Labor Utilization by Farm Size



capital cost of a workplace BUT at the same time maintaining reasonably high output and net income per available laborer such that net income per person rises as well? Are there technologies currently existing in Guatemala which meet these criteria, and if so, are they in crop types and climatic settings which give hope for their broad extension to other farmers?

Though figures are not available to establish good estimates of the total number of economically active agricultural laborers in Guatemala, from the historical estimates available, now at least four years out of date, the number is probably about 1.1 million. If we assume the average employment rate for the group as a whole to be 50% (see Table 43) that means that more than 500,000 man years of employment are unused at present. Let us assume the capital cost of providing one *added* workplace to be equal to the *average* cost of a workplace (that is assuming non-land capital to be near full utilization) and assume that whatever reordering of

Table 42.–Labor Utilization on Large Farms

	Man Days Utilized per Ha. Cultivated	Man Days Utilized per Arable Ha.	Credit as % of No-Credit
Large Farms			
10-20 Ha.	48	43	105
Credit	46	44	
No-Credit	49	42	
20-50 Ha.	51	35	148
Credit	57	40	
No-Credit	41	27	
50-100 Ha.	51	22	120
Credit	56	24	
No-Credit	48	20	

Table 43.–Capital Costs of Providing one Full Time (280 Work Day) Workplace in Agriculture (Excluding Land), By Farm Size, Region and Credit Type

	Central Highlands	South Coast (West)	South Coast (East)	Northeast	Southeast Highlands
Q of Capital Value to Provide One Workplace					
Small Farms	1295	444	925	1147	1036
Credit	1295	370	925	1295	1036
No-Credit	1702	550	925	1036	1036
Large Farms	1480	1739	1739	2072	2072
Credit	1295	2072	2072	2072	1480
No-Credit	2072	1726	1480	2590	2590
Large Farms as % of Small Farms	115	392	188	181	200
No-Credit Small Farms as % of Credit Small Farms	148	149	100	80	100
Crop Mix % of Total Value Harvested in the Crop Indicated	Wheat 33% Corn 23% *Milpa 13% Garlic 7% Potatoes 4% Beans 2%	Corn & Sesame 36% Corn 32% Sesame 8% Rice 1%	Corn 48% Sesame 13% Rice 9% Sorghum 7%	Corn 26% Tomatoes 24% Potatoes 7% Milpa 7% Onions 6% Rice 6% Flowers 3%	Corn 19% Milpa 14% Rice 11% Onions 10% Beans 9% Tomatoes 3%

*Corn and Beans intercropped

current land ownership patterns will not require new capital but will be accomplished merely with internal transfer payments. We can select different non-land capital costs of added workplaces from Table 44 and estimate the added capital required to absorb the current unemployment pool of workers. Let us keep in mind that the approximate size of the annual credit granted to agriculture in Guatemala is less than U.S.$100 million.

4. Implications of Transferring Technology from Developed Countries.

Using technology similar to that which is current in the U.S., it would take Guatemala U.S.$20.6 billion to absorb the currently unemployed pool. Even if successful, Guatemala would need an additional U.S.$19.9 billion to reabsorb the 97% of the 500,000 employed

Figure 15.--Capital Costs (Excluding Land) of Providing One Full Time (280 Work Day) Workplace in Agriculture, by Farm Size, Region and Credit Type

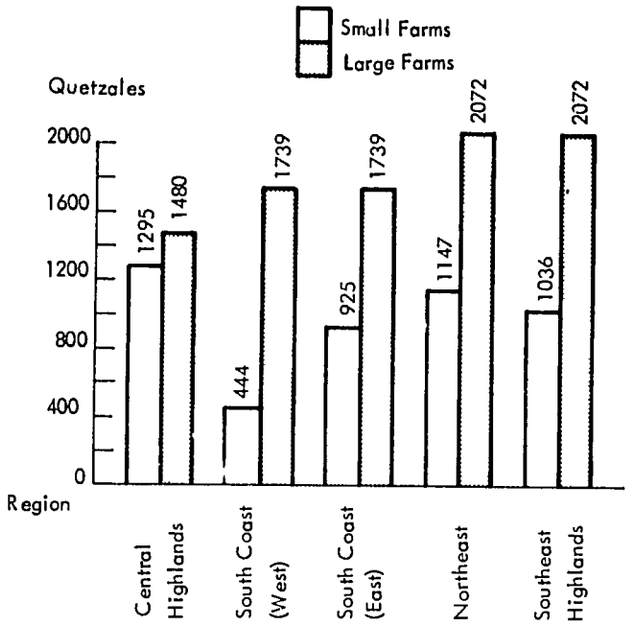


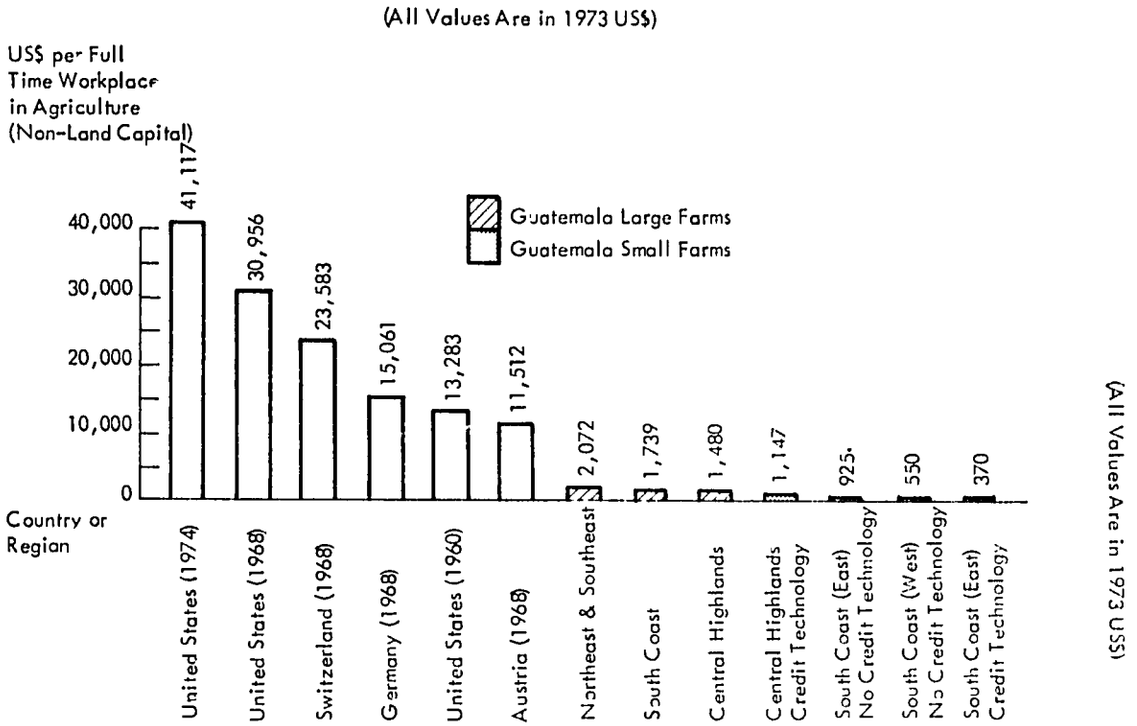
Table 44.--Capital Costs of Providing one Full Time Workplace in Agriculture for Selected Countries and Years

(All Values are in 1973 U.S. $)	U.S. $ Per Full Time Workplace in Agriculture *(Non Land Capital)*	U.S. $ Per Full Time Workplace in Agriculture *(Including Land)*
United States (1974)	41 117	111 126
United States (1968)	30 956	83 581
Switzerland (1968)	23 583	30 893
Germany (1968)	15 061	18 374
United States (1960)	13 283	35 864
Austria (1968)	11 512	15 310
Guatemala		
Northeast & Southeast Large Farms	2 072	5 600
South Coast Large Farms	1 739	4 700
Central Highlands Large Farms	1 480	4 000
Central Highlands Small Farms (Credit Technology)	1 147	3 110
South Coast (East) Small Farms	925	2 546
South Coast (West) Small Farms (No-Credit Technology)	550	1 474
South Coast (East) Small Farms (Credit Technology)	370	1 077

Source: See Sources, Table 30.

workers who would be displaced by the technology from jobs they already have. Just switching to German technology could save Guatemala more than U.S.$26 billion; the job could be accomplished for about U.S.$15 billion including the 500,000 currently unemployed and the 93% of those currently employed who would be displaced. All of this makes obvious the critical importance of searching nor for added capital but for

Figure 16.—Capital Costs of Providing One Full Time Workplace in Agriculture for Selected Countries and Years



technologies which are efficient in producing net per person income double or triple the current Guatemala averages, and requiring not much more and perhaps even less than current levels of capital per employed laborer. These figures also highlight the extreme sensitivity of the labor market to capital rich technology. What the U.S. technology does very well is maximize production when labor is THE scarce resource. Since more than half of the Guatemalan man days available in agriculture appear to be unutilized, and 25,000 new laborers join the labor pool each year, the U.S. should be very reticent to suggest that its technology has much to offer in the Guatemalan context. No one would suggest, if asked, that the magnitudes of capital mentioned above could ever be made available to Guatemala or that such a system could even function if the capital were available, yet many even claiming that their strategy is compatible with the employment objective are recommending a technological package which implies these rather absurd magnitudes.

5. Labor Intensive Technologies Available in Guatemala

Setting aside the possibilities that unmodified external technologies from the U.S. or Europe might help the problem, we turn to a search among the existing Guatemalan technologies to see if any of these fit, or more nearly fit the magnitude of the task, AND the resources which might be available to meet the task.

Table 44 leads us to the South Coast where the credit and no credit small farms had capital costs of workplaces less than 1/2 the estimated national average. The first question we will want to investigate is the net income per laborer in these farms to see if the net income per person is high enough that they are viable income technologies, and to examine the capital net income productivities to see if the technologies are financially profitable and hence "bankable". Before examining this question in more detail we detour for a few paragraphs to examine an alternative method of estimating the capital or credit requirements of generating employment.

We noticed in an earlier part of this chapter that farms with credit almost universally utilized more labor per arable hectare then the no-credit farms. We can infer that this added employment was made possible by the credit. If we divide the added man days of employment per Q of credit, we have an alternative estimate of the added credit required to generate a man day of employment. Since the observed wage ranges from about Q0.85 to 1.02 per day, it might be suggested that from Q4 to Q10 of credit will generate an additional man day of

Table 45.–Credit Costs of Generating Employment by Farm Size (National Averages)

	Man Days of Hired and Family Labor per Ha. Cultivated	Added Man Days of Labor per Farm on Credit Farms	Average Size of Loan per Farm	Q of Loan per Man Day of Added Employment	Credit Cost of Adding One Man Year (280 Days)
0-1 Ha.					
Credit	198	46	279	5.81	1627
No-Credit	128				
1-3 Ha.					
Credit	81	55	355	6.45	1806
No-Credit	71				
3-5 Ha.					
Credit	63	64	376	5.87	1644
No-Credit	58				
5-10 Ha.					
Credit	63	157	544	3.46	969
No-Credit	53				
10-20 Ha.					
Credit	46	0	728	—	—
No-Credit	49				
20-50 Ha.					
Credit	57	333	1103	3.31	927
No-Credit	41				

hired labor. Table 45 presents the hired and family labor added per Q of credit. When we compare the results of Tables 43 and 45, we find that at the national level Table 45 appears to contradict the conclusions from Table 43, that smaller farms have lower capital requirements per labor unit. One possible explanation for this difference is that the larger farms run their capital stock at a lower utilization rate, and therefore with added credit purchase proportionally more variable cost inputs which would lead to an artificially lower cost of employment since it will only stay that low until the farm's stock of capital goods reaches full employment.

We return now to the search for viable technologies which have efficient employment generation capacity with little capital. If employment could be generated at the level of the small no-credit farms in the South Coast West region of Q 550/man year (see Table 43), the capital cost of absorbing all of the unemployment pool of 500,000 workers would be Q275 million instead of the Q8-20 billion implied by the U.S. or European technologies. In addition, if the current cultivation which employs 500,000 full time equivalents could be shifted to this Q550 per man technology, the capital freed would absorb the complete unemployment pool. That is to say that if all of Guatemala's farms operated at the Q550 per man technology, the current existing stock of capital would absorb all available labor. It is worth noting the net income per person, output per man day utilized, and capital output the net income productivity implications of choosing the Q550 per man technology. These productivity measures are presented in Table 46. The figures in Table 46 are presented not because we think we have found the technology which could be spread over Guatemala and solve the employment problem. Rather they are presented to indicate that the technologies which are more labor rich do not necessarily imply lower net income or output per person (if there is substantial unemployment), lower financial profitability, lower capital output productivity, or lower output or income per Ha. Shifting downward on the capital/labor scale would be a step forward for Guatemala if the proper combination of factors could be found in a technology. The search for labor-saving technologies has been an extremely costly enterprise, but consistent efforts on the part of a large and well funded university and government research community has yielded the necessary technological packages. The search for capital and land saving technologies, though a search in an almost opposite agronomic and engineering direction, should yield successful technological packages. Even though there are large research entities in many underdeveloped countries, very few of the resources are aimed at finding viable capital and land saving technologies. For some reason their energies are by and large directed at solutions which would be most appropriate for capital and land rich/labor scarce economies. Research must be turned around if countries like Guatemala are to find the packages which will allow the

magnitudes of their resources to meet the magnitudes of their problems.

Table 46.–Comparisons of the Small Farm Credit Technology of the South Coast (West) with the Overall Sample Average

	South Coast West Average Small Farm No-Credit	Average of all Small Farms Sampled in all Regions
Non-Land Capital Value per Man Year of Labor Utilized Q or U.S. $/Man Year	550	1036
Net Income per Available Laborer	402	347
Capital Productivity		
Q Net Income/Q of Capital	.33	.18
Q of Output/Q of Capital	.54	.39
Land Productivity		
Q of Output/Ha. Cultivated	220	271
Q of Net Income/Ha. Cultivated	133	124

6. Comparisons between Farm and Off-Farm Employment Levels

Table 47 presents the employment rates for the two overall farm size divisions and by region. A number of important conclusions may be drawn from this Table:

1. Almost all farmers are employed as much as laborers as they are on their own holdings.
2. In the Central Highlands, the on-farm and total-employment rates are significantly better for credit farms.
3. In the Northeast and Southeast Highlands, the credit farms are slightly less employed, both on-farm and total.
4. Employment rates are extremely low in the absolute when compared with the other estimates available for Guatemala but quite similar to the results of a similar survey in Colombia on 3000 small credit farms where average on-farm employment rates varied from 25-43%.

Table 47.–Employment Rates for Family Labor by Farm Size and Region (% of Available Family Man Days Utilized) (280 Days = 1 Year)

	Central Highlands	South Coast (West)	South Coast (East)	Northeast	Southeast Highlands
Small Farms Total	18.5%	25.4%	25.2%	17.7%	21.1%
Credit	24.3	28.3	34.8	16.0	19.4
No-Credit	14.6	23.7	15.4	19.7	21.7
Large Farms Total	20.9%	34.0%	39.7%	25.7%	39.4%
Credit	30.0	33.4	48.0	25.4	43.4
No-Credit	10.3	35.1	32.9	26.3	36.3
% of available family available labor employed off farms					
Small Farms Total	23.5%	35.6%	15.2%	33.0%	27.0%
Credit	31.3	29.3	14.4	33.6	27.3
No-Credit	17.5	38.8	15.8	33.3	27.6
Large Farms Total	52.2%	2.6%	10.3%	na	na
Credit	70.0	4.0	5.7	na	na
No-Credit	47.4	0.7	14.6	na	na
Total Employment Rate. % of family available man days employed on and off farm					
Small Farms Total	42.0%	61.0%	40.4%	50.7%	48.1%
Credit	55.6	57.6	49.2	49.6	46.7
No-Credit	32.1	62.5	31.2	53.0	49.3
Large Farms Total	73.1%	36.6%	50.0%	na	na
Credit	101.3	33.3	20.1	na	na
No-Credit	64.9	39.5	30.4	na	na

C. SEASONAL EMPLOYMENT PATTERNS

1. A National Overview of Monthly Variations in Employment

Figure 17 presents relative employment rates for farms of all sizes, and the smallest (0-1 ha.) and largest (10+ ha.) size classes respectively based on the assumption of 240 workdays per year. These bar graphs serve to highlight one of the major characteristics of agricultural employment which compounds the problems of achieving the income and employment objectives stated previously. This characteristic is the extreme variations in on-farm family employment opportunities during the year. For the nation as a whole, disregarding farm-size difference, family employment varied between 12% in February and 43% in May (see Figure 17). Other months show considerable variability in demand for labor with the result that many family members have solid employment only during a small portion of the year.

These data cast additional light on the observation made earlier that the most serious income gap is between the poorly paid worker and the *unemployed* worker rather than between the well paid and poorly paid worker. This income gap is chronic at all times but becomes severe during the first three months of the year. Because such a small fraction of the family labor force is earning during these slack months total yearly income is pulled way down. If only employment in each month were raised to the peak-month level of 43 percent, overall family incomes would be raised by almost two-thirds. This impressive income gain would be achieved without any increase in the wage rate and with a persistant 57% of the family labor force still structurally unemployed. The only change would be eliminating the seasonal unemployment.

2. Differences in Seasonal Employment Patterns among Farm Size Classes

Figure 17 contains data on national average seasonal family hire on the smallest (0-1 ha.) and largest (10+ ha.) farm groups. These two groups are presented to gain an idea of the extremes in both the levels and in the seasonal fluctuations in employment, the levels are of course lowest for the small farms indicating a major problem with structural unemployment on these farms. The large farms have almost completely overcome this problem yet are greatly plagued by the seasonality problem.

It is interesting to note that seasonal variation is a relatively minor problem on the smallest farms when compared either to the all-farm average or particularly to the large farms. The small farms show a range of 5.4 percent, or a fluctuation of one and one half times over the low value of a 3.4% employment rate, yet on the large farms the comparable fluctuation is close to three and one half times the low rate of 19.3 percent employment. Thus it appears that the small farmers have compensated for their extremely low levels of employment by lowering the degree to which they suffer variations in seasonal labor hire. They accomplish this by growing crops and using cultivation techniques which require relatively constant attention throughout the year.

Figure 18A demonstrates the relative levels of family hire for farms of different sizes. They are shown for the month of May, which in most cases is a period of peak demand. The figure illustrates well the disparities between small and large farm employment possibilities. Even though small farmers are cultivating their land more labor intensively and have greater productivity as already discussed, the fact remains that the small farm is just not absorbing anywhere near its available labor. The large farm by contrast has achieved a level of essentially full employment. In terms of output and employment objectives this would seem to suggest that a plausible policy would be the redistribution of land while insisting on the labor intensive cultivation techniques of the smallest farm size-class. By granting the smaller farmer more of the land either by subsidizing or purchase or land reform, they would have greater area on which to practice their high productivity techniques.

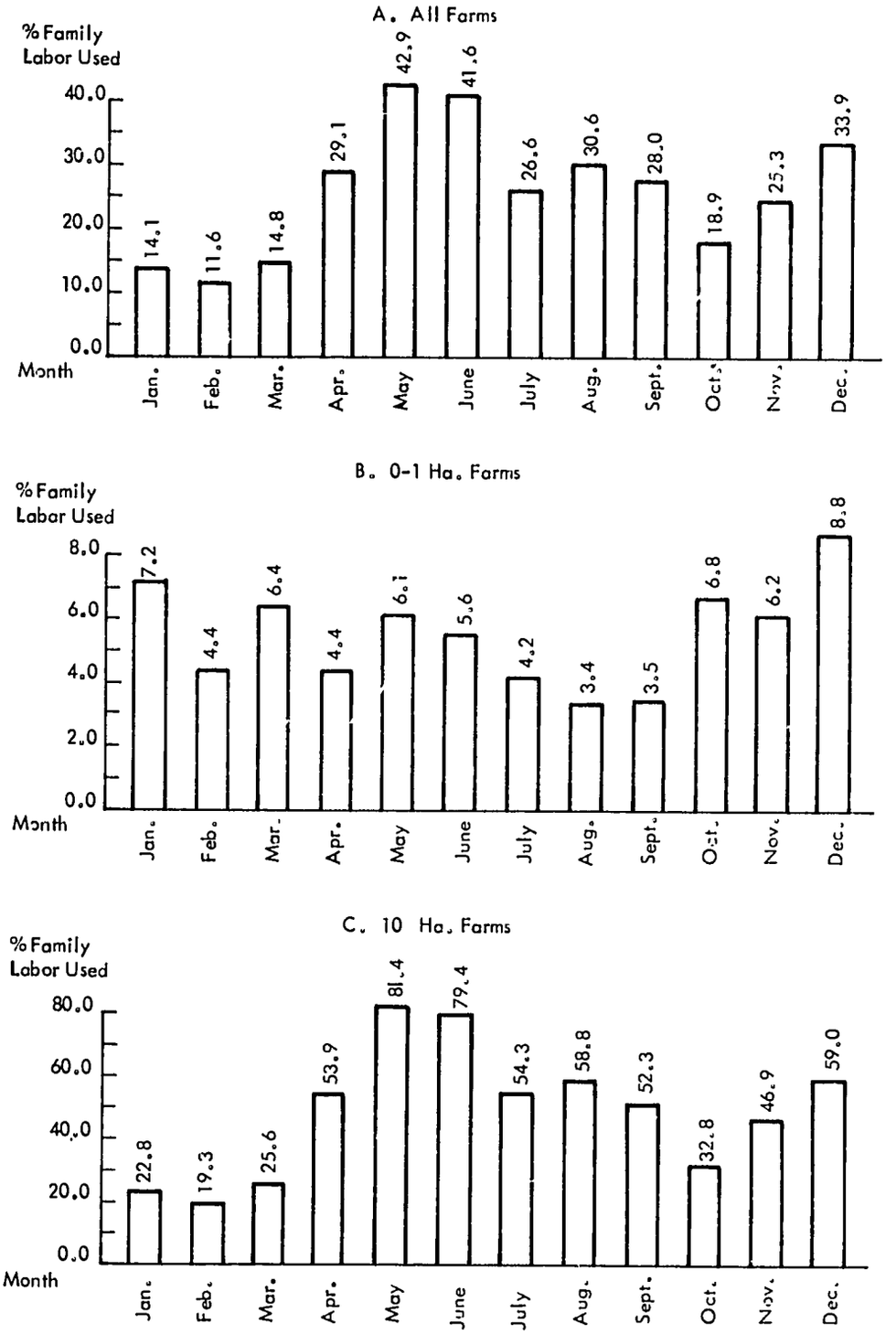
3. Comparison of Seasonal Employment Patterns between Regions

Figure 19 shows the monthly family labor hire patterns in each of the five regions of the country. They are summarized in Figure 18B which presents the employment level in each region for the month of maximum employment. Great variation in employment levels between regions is evident from these bar graphs. The South Coast and Southeast Highlands offer the best employment possibilities while the Central Highlands show the lowest levels.

This figure also reveals interesting information about the differences between regions in terms of months of high labor demand. Which in turn suggests certain patterns in seasonal labor migration. The first inference which may be drawn is that migratory labor comes from the Central Highlands and goes mostly to the South Coast due to the large disparities in levels of demand mentioned previously. Secondly, the months of August and September probably see the greatest movement of

Figure 17.—Monthly Employment Rates: National

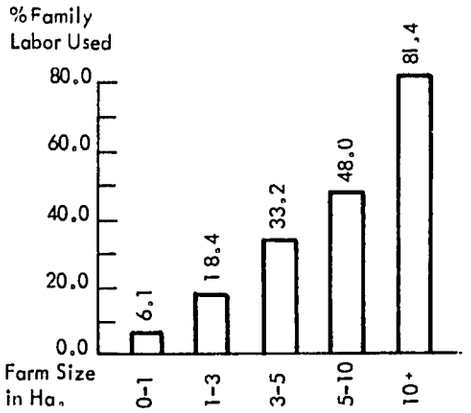
(% Family Labor Used)



workers from the Central Highlands to the coast because of the relatively great differential in labor demand in those two months between the respective regions. May and June, although they are months of peak demand on the coast, would not see such a large influx of workers to the coast due to the relatively high demand for their services in the highlands. On the other hand the levels of unemployment in the highlands are so high (over 70 percent in the peak months) that migration is probably not impaired much in June.

Figure 18.–Family Peak Month Employment Rates

A. % Family Labor Used (National), May



B. Highest % Family Labor Used in Each Region and Corresponding Month

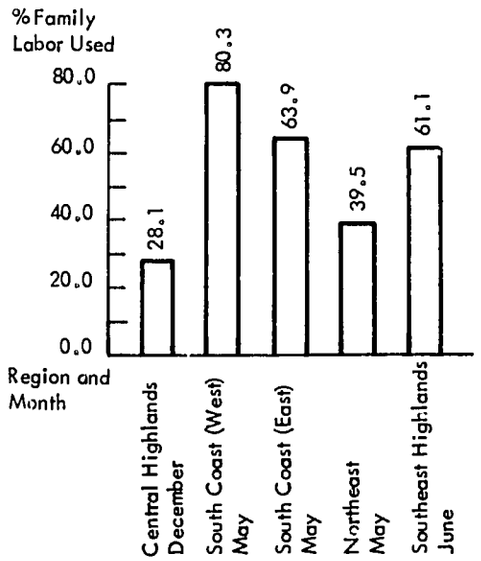


Figure 19.—Regional Employment Rates

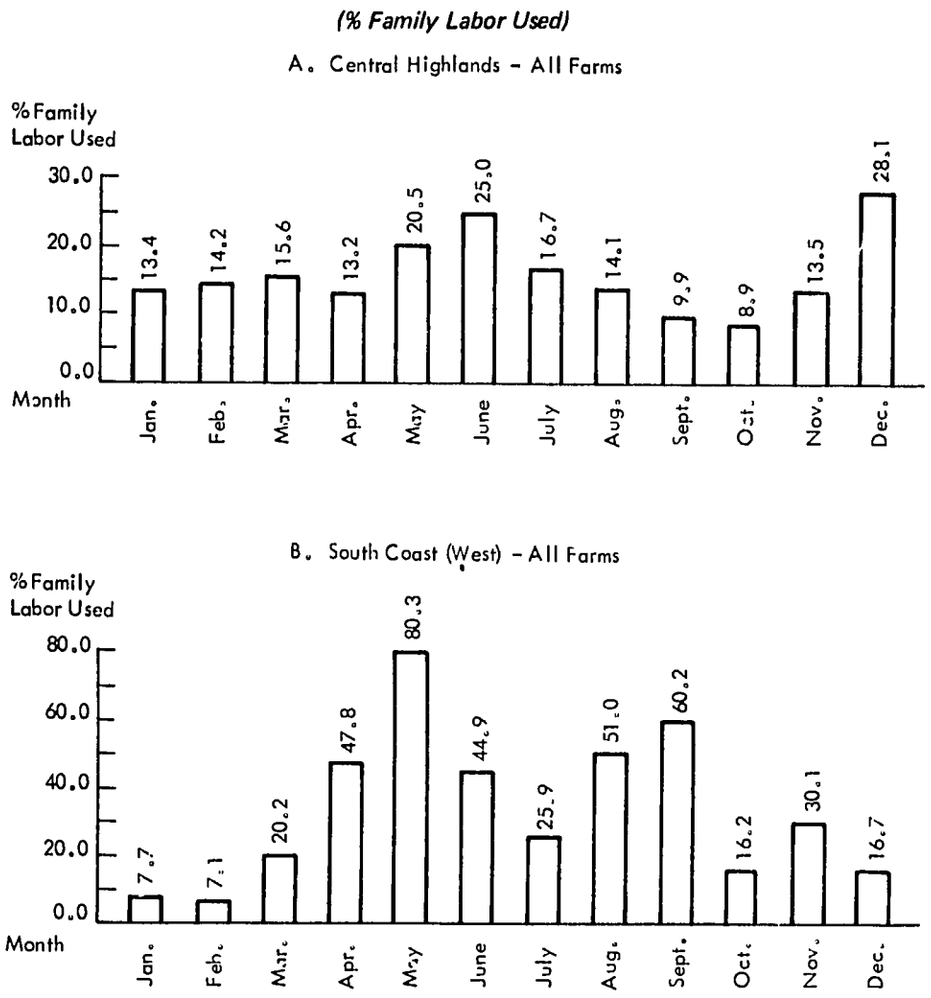
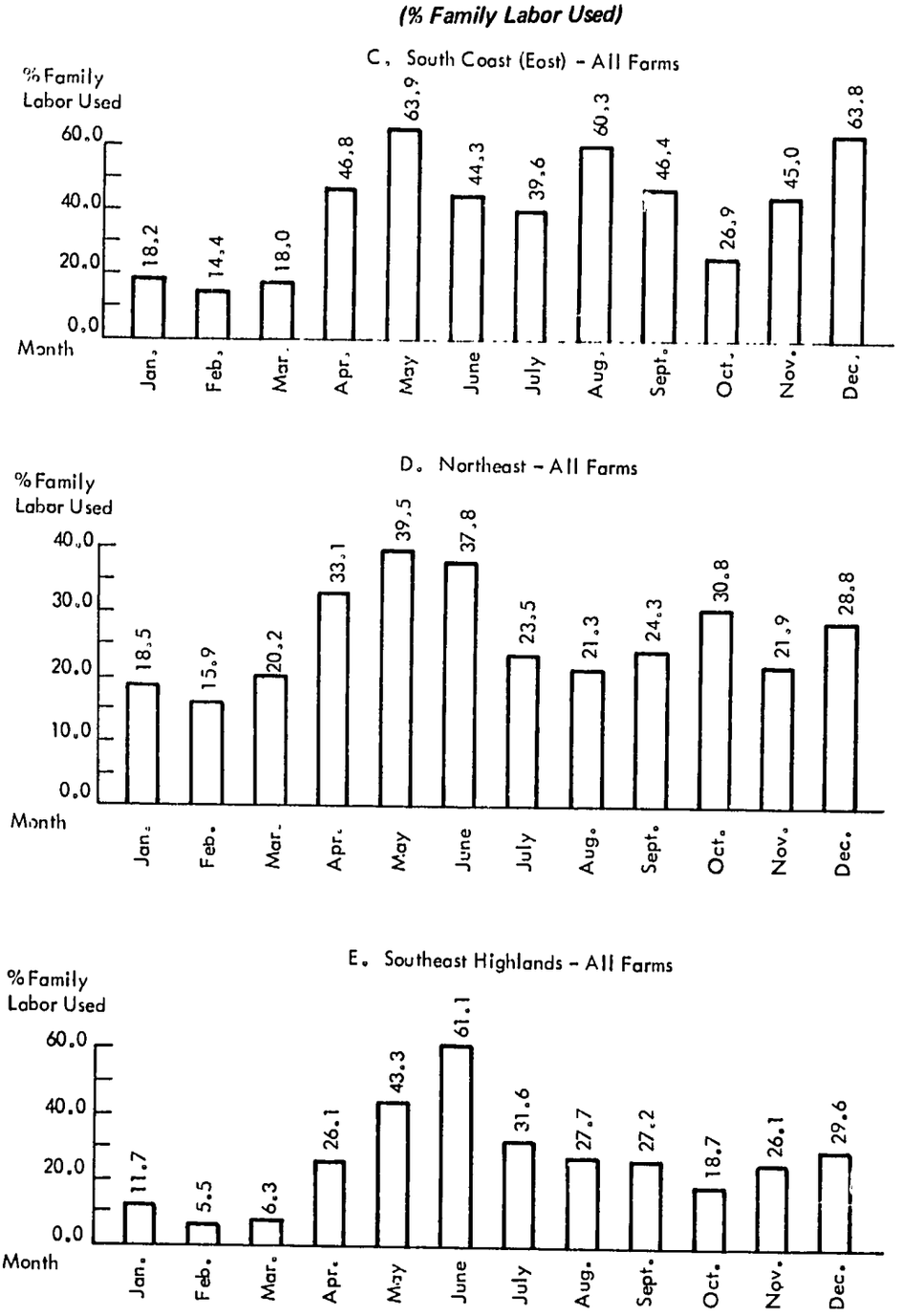


Figure 19.--Regional Employment Rates--Cont'd.



CHAPTER EIGHT: THE INTERMEDIATE IMPACT OF CREDIT ON THE USE OF PRODUCTION INPUTS

A. THE TYPES OF FARMERS GETTING CREDIT

1. Difficulties in Obtaining Information About Informal Sources of Credit

This chapter will attempt to track the performance of small farms with differing levels of institutional credit. The institutional credit group will be compared on similar productivity criteria to the ones used in the last chapter. This comparison is complicated by the fact that information on informal credit sources of small farmers is difficult to obtain. Small farmers are generally nót willing to divulge information on their indebtedness.

Based on experience in the Colombian surveys which indicated the futility and inadvisability of pressing for information about farmer cash reserves, it was determined at the outset of this study that no attempt would be made to obtain information from the farmer about his cash reserves. The reader should realize that when we compare the credit and no-credit groups, we are really comparing farmers using institutional credit with those who financed their operations from unreported informal credit arrangements, or from their own cash reserves.

In an effort to escape this data difficulty, we will make comparisons based on the intensity of credit use by comparing the performance of farms using different quantities of institutional credit and attempt to draw some policy judgements from the differences. The sense in which the comparisons between the credit and no-credit farms are reasonable is as a comparison between the efficiency of those farms whose funds came from a formal institution (BANDESA) as opposed to those using other sources (informal or farmer cash reserves).

2. A Profile of Farmers Receiving Institutional Credit

In this section we seek to identify the kind of farmers who have been the principal recipients of the institutional credit to see if the basic "target man" so often referred to in A.I.D. programs is being reached Answering this question has the side benefit for our later productivity discussion of acquainting us with the characteristics of the farms whose performance we will subsequently track.

From Table 48 it can be observed that there is an expectably strong trend to make larger loans to the larger farms. The tendency is made clearer in Table 50 where land size and amounts of credit are displayed. The quality of land as indicated by the estimates of its

Table 48.—Farm Size and Land Value Characteristics by Level of Credit Use

	Amount of Institutional Borrowing Last Crop Year in Q						
	1-100	100-250	250-350	350-500	500+	No-Credit	Average Credit
% of Credit Farms in each level	6	34	22	14	24	0	
Average Size of farm in Ha.	2.37	3.15	3.90	4.48	5.44	3.32	4.00
Farmer estimate of commercial value of land per Ha.	377	463	470	396	509	471	467
Average size of loan	72	175	290	402	937	0	238
% of Q loaned to each group	1	15	16	14	55	0	

Table 49.–International Comparisons of Land Value in U.S.$/Ha.

Country	U.S.$/Ha.	As % of Average Guatemala Small Farms 0-10 Ha. Average 465=100
Japan	7126	1532
Switzerland	1369	294
Guatemala		
Credit 0-1 Ha	1150	247
No-Credit 0-1 Ha.	1102	237
Denmark	816	175
Guatemala		
Credit 1-3 Ha.	663	143
No-Credit 1-3 Ha.	507	109
United States	457	98
Guatemala		
No-Credit 5-10 Ha.	447	96
Credit 3-5 Ha.	443	95
No-Credit 3-5 Ha.	411	88
Credit 5-10 Ha.	391	84
Credit 10-20 Ha.	380	82
No-Credit 10-20 Ha.	337	73
Canada	309	66
Guatemala		
Credit 20-50 Ha.	305	66
No-Credit 20-50 Ha.	277	60
No-Credit 50-100 Ha.	242	52
Credit 50-100 Ha.	202	43

market value do not appear to distinguish clearly the groups except the smallest and largest loan size farms.

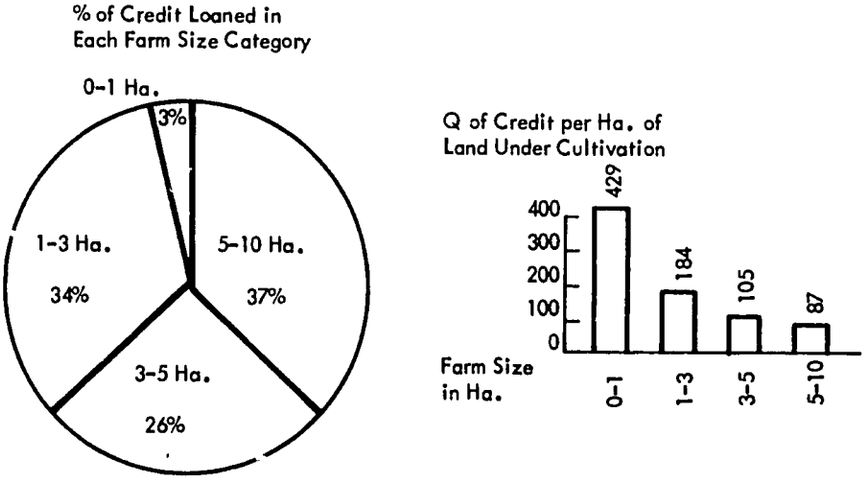
The value of land for the smallest of the loan groups is only 80% of the average for all credit farms (Q467) but the small size of the sample for this group leads us to question the reliability of this difference. The finding that the large loans are made to farmers with higher than average quality of land is on firmer ground even though they are only 9% higher value per hectare than the credit farm overall average. Institutional credit allocation in general appears not to favor farmers with a higher land quality since the average land value estimates for the credit (467) and no-credit farms (471) are almost identical. (See Table 49 for a comparison of land values of different farm sizes by credit group with averages for various countries.)

Table 50 and Figure 20 give the distribution of credit and the credit intensity on the cultivated land base by farm size to determine which of the farm size groups is favored with a richer supply of institutional credit. The data in Table 50 indicate that BANDESA is reaching a respectable number of small farmers. The two groups that have less than 3 hectares account for 44% of the credit farmers. The 3 smallest farm size groups, those with less than 5 hectares, account for 72% of the BANDESA farmers. Given that this is weighted data and that farm selections by size are proportional, these data

Table 50.–Credit Use by Farm Size

	Farm Size in Hectares			
	0-1	1-3	3-5	5-10
% of Credit Farms	5	39	29	28
% of No-Credit Farms	16	39	24	22
Average Size of Loan	279	355	376	543
Q of Credit per Ha. of Land Under Cultivation	429	184	105	87

Figure 20.–Credit Use by Farm



should be close to the actual distribution of credit by farm size. Note that with respect to credit intensity the farms under 1 ha., who do receive credit, receive a very high amount per cultivated ha. and have reasonably high credit per Q of output. It should be noted that, while the loan size increases as farm size increases, the credit available per cultivated hectare drops steadily and significantly. Credit farmers in the 5-10 ha. range received only Q87 per cultivated hectare, which is approximately 1/5 that of those in the less than 1 ha. group (Q429 per ha.), and 1/2 that of the 1-3 ha. group (Q184 per ha.).

Table 51.–Credit Use per Q of Farm Expenditure

	Farm Size in Hectares			
	0-1	1-3	3-5	5-10
Q of Credit per Q of farm expenditures	.73	.70	.62	.50

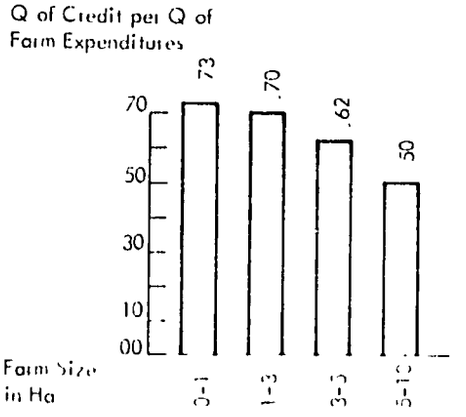
3. The Effect of Crop Mix on Credit Intensity in Different Farm-Size Groups

While the credit per ha. cultivated appears to indicate that the smallest farmer has a more concentrated dose of credit, this is mostly explainable by differences in crop mix. The smallest farms dedicate more of their land to crops that require larger amounts of credit. This hypothesis is tested in Table 51 and Figure 21 where credit per quetzal of farm expenditure is calculated for each of the farm sizes.

While the credit per hectare cultivated on the smallest farms is five times as high as the largest farm group, the credit per Q expended on inputs is only 1 1/2 times higher. This can explain most of the credit intensity of those few smallest farms who received credit. The question of why they are 46% more intensively supplied with credit is explained by the data given in Tables 54 and 55 which give some characteristics of crop mix and credit given by specified crop group. It should also be noted that the larger of the small group appear to be able to finance a larger portion of their circulating capital requirements from their own resources, or from unreported informal sources.

The smaller farms have a higher rate of plantings of crops that have higher credit requirements. Note that in table 52 only 46.3 percent of the plantings of the smallest size farm group are in the basic grain groups, compared to 72.9 to 84.5 percent for the other farm size groups. The basic grains have a very low maximum finance limit per hectare compared to the other groups of crops. (See table 53.) A careful review by the reader

Figure 21.–Credit Use per Q of Farm Expenditure



of these two tables will reveal that not only do the smaller farmers, on the average, cultivate their land more intensively but also have a higher ratio of high-cost, high-value products than do the larger farms.

B. THE ELEMENT OF RISK IN FARMER BEHAVIOR

1. Reasons for Risk Averse Behavior

Two general reasons are usually cited to demonstrate the cautious bias of subsistence farmers:

1. Their alleged unwillingness to use modern inputs (such as improved seeds, fertilizer, etc.) because of the inherent risk attached.
2. Their unwillingness to extend themselves financially by taking on large loans (large relative to their financial base) for either use of modern inputs or to expand their own operations.

Let us separate the first of these suggestions into two parts or possible interpretations:

a. The farmer may be convinced that the probable return to these modern inputs is high, but the small risk associated with their use may deter him.
b. The farmer may be convinced that the modern inputs are not good investments in the first place.

It should be noted that only the first of these two cases is evidence of excess caution on the part of the farmer. It is all too easy for the extension agent, the research establishment, or the foreign advisor to say that the reason for low rates of adoption of "modern inputs" or "modern technology" is the excessive "risk aversion" behavior allegedly characteristic of small farmers all over the world.

Table 52.—Number and Percent of Plantings on Bandesa Farms by Farm Size and Crop Groups (Weighted)

Crop Group	0-1	1-3	3-5	5-10	10	Total
Basic Grains	152.	1834	1213	1499	1876	6574
Other Temp. Food Crops	157	639	245	215	322	1578
Flowers	18	8	0	8	0	34
Permanent Crops	1	34	96	51	112	294
Total	328	2515	1554	1773	2310	8680
Percent Basic Grains	46.3	72.9	78.1	84.5	81.2	77.5
Percent Temp. Food Crops	47.9	25.4	15.8	12.1	13.9	18.6
Percent Flowers	5.4	1[1]	0	0.5	0	0.4
Percent Permanent Crops		1.4	6.1	2.9	4.8	3.5
	99.6	99.7	100.0	100.0	99.9	100.0

[1] Less than 0.1 percent.

Table 53.—Authorized Credit Limits by Crop Group in 1973

Crop Group	Group Average	Authorized Range	
		Min.	Max.
Basic Grains[1]	146	113	190
Other Temp. Food Crops[1, 2]	756	451	1753
Flowers[3]	4645	3229	5650
Permanent Crops[1, 4]	703	524	1070

[1] Simple average.
[2] Includes cauliflower, cucumbers, eggplant, celery, melon, potatoes, beets, dry onions, tomatoes, garlic, chili pepper, cabbage, carrots, and lettuce.
[3] Average and range of observations reported in the survey.
[4] Includes planting costs and one year of maintenance costs for citrus, avocado, deciduous fruits and bananas.
Source: Data provided by BANDESA.

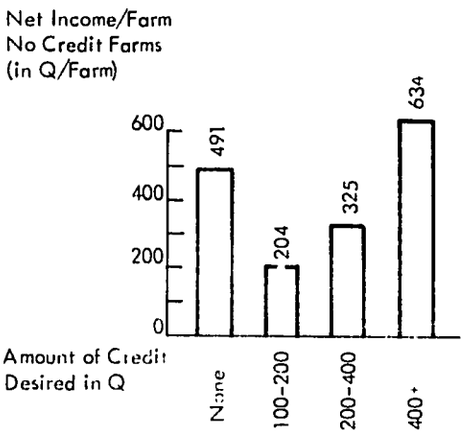
Table 54.—Financial Extension Indicators for Small Farms by Levels of Credit Desired

	Amount of Credit Desired in Q			
	None	100-200	200-400	400+
% of Farms No-Credit Farms	63%	6%	18%	13%
Net Income/farm No-Credit Farms (in Q/farm)	491	204	325	634

Table 55.—Regional Comparisons of Farmer Net Income by Levels of Credit Demand

	Amount of Credit Desired in Q			
	None	100-200	200-400	400+
Net Income/farm All Small Farms				
Northeast	198	27	82	269
South Coast (West)	502	172	98	692
South Coast (East)	1004	713	440	780
Central Highlands	702	643	530	885
Southeast Highlands	485	178	407	727

Figure 22.–Financial Extension Indicators for Small Farms by Levels of Credit Desired



Treatment of the impact of the use of modern inputs will follow in subsequent sections. It is worth noting at this point, however, that in Guatemala there appears to be good reason for farmer caution in the use of modern inputs for many crops. We must remember that the caprice of weather and pests makes farming by its very nature a risky business.

2. Willingness to Take Financial Risks

The only part of the risk question we can address at this point is the apparent willingness (or lack of it) of small farmers to extend themselves financially.

Table 54 and Figure 22 give the relationship of the Non-BANDESA farms requesting different levels of credit and average farm income.

Table 55 presents some regional comparisons of net income levels and levels of credit desired by non-BANDESA farmers.

Table 56 gives the relationship of the percent of farms by specified credit levels requested by region. It is interesting to note that the percentage of farmers willing to extend themselves for low levels of credit in the poorest section of the country is about double the rate in the other regions. These numbers are relatively small and the differences may be due to:

1. Sampling error and/or
2. A willingness of farmers who are precariously close to starvation to extend themselves in an attempt to improve their situation.

It appears that about twice as many farmers receiving credit are willing to extend themselves even more. About 67 percent of the BANDESA group indicated that they could use more credit compared to 37 percent of the non-BANDESA group that indicated that they would like more credit.

The average additional quantities requested for small and large farmers are Q576 and Q1741 respectively. Given the averages received in 1973, this indicates a willingness of small and large farmers to increase their risks by factors of 2.5 and 2.9 respectively. This indicates that the lack of knowledge of the benefits of a credit program may be an important factor affecting the willingness of farmers to accept risk.

Table 56.–Percent of Farmers Requesting Credit by Region and Level of Credit Demand

	Amount of Credit Desired in Q			
	None	100-200	200-400	400+
Percent of No-Credit farms.				
Northeast	69	7	14	9
South Coast (West)	48	4	12	28
South Coast (East)	74	4	6	13
Central Highlands	64	4	16	15
Southeast Highlands	53	3	30	14

C. THE INPUT USE PERFORMANCE OF FARMS WITH DIFFERENT AMOUNTS OF CREDIT

1. Credit Impact on Land-Use Intensity

In Table 48 we observed that the quality of the land, as indicated by the farmers' estimate of its commercial value, did not vary widely with the amount of credit used. We will now explore the land use patterns of these farms classified by the amount of credit they received. We will want to see if the increases in credit are accompanied by increases in the percent of land cultivated.

Most of the farmers asking for more credit indicated that they would use it to grow more of some crop they were already cultivating. Increasing amounts of specific crops may have been a common way of increasing farmer income, and those desiring credit were simply planning to do what they had done before (if they were past credit recipients) or what they had seen done in their area (if they had no credit last year). Table 57 tests the hypothesis: *Credit was used to increase the intensity of land use.* The use coefficients presented in the table seem to indicate that farms with more credit were able to expand the use of available land on the farm. Table

Table 57.—Land Use Patterns by Level of Credit Use for Small Farms

	Amount of Credit Used in Q					
	0-100	100-250	250-350	350-500	500+	None
Percent of land cultivated (in crops)	96.2%	114.6%	106.4%	106.4%	120.5%	97.8%
Average size of farm in Ha.	2.37	3.15	3.90	4.48	5.44	3.32

Table 58.—Land Use Patterns by Level of Credit Use for Large Farms

	Amount of Credit Used in Q					
	0-100	250-500	500-1000	1000-5000	5000+	None
Percent of land cultivated (in crops)	40.9%	53.6%	56.4%	60.6%	43%	49.9%
Average size of farm in Ha.	16.8	19.14	27.5	32.8	104.3	27

58 presents similar calculations for large farms. On both large and small farms the percent of land cultivated increases with increasing credit and with increasing size of farm. The fact that credit farms increase their land use intensity even as land area in the farm increases lends strong support to the hypothesis that credit "caused" that increasing land use intensity. Tables 59 and 60 and Figures 23 and 24 present comparisons of the credit and no-credit farms on their land use intensity. The no-credit farm column in Table 59 is strong evidence of the decreasing tendency of larger farms to cultivate all their land. Except for two groups, the BANDESA credit farms are significantly better than the no-credit farms. The percentages presented in these tables exceed 100% in cases of significant double-cropping and/or interplanting.

All of the land in a farm is not arable, therefore, we must obtain a measure of more precise "arable" land available in the farm in order to finalize the conclusions drawn from Table 48. Table 60 presents these comparisons. Measured by percent of arable land cultivated, the tendency in the no-credit farms of lowering intensity with increasing farm size is just as consistent as the trend in Table 59. The credit farms, by this purer measure are still significantly superior to all but the smallest of both groups, but their superiority is much less marked in the large farm sizes. The differences in large farms would lead to the conclusion that credit did not apparently cause any significant increase in land use intensity among the larger holdings. It appears that the marked superiority of large credit farms in Table 59 is illusory, and can be explained by differences in the proportions of arable land between credit and no-credit large farms.

In this section we have been attempting to identify farm characteristics associated with credit use intensity. While these characteristics are not the equivalent of our three objectives, net income, food production and rural employment, they serve to identify the intermediate impacts of credit. For example, credit may cause increased production by a vriety of intermediate impacts. These might be increased land in cultivation, increased use of inputs on a constant sized cultivated area, increased labor, increased machinery, or changed practices with constant quantities of physical inputs. In the next section we will make the direct performance comparisons of how well the farms with different levels of credit created net income, produced food, and employed labor.

Table 59.—Land Use Intensity by Farm Size: Percent of Land in Farm Cultivated

	Credit Farms	No-Credit Farms
Small Farms		
0-1 Ha.	107	121
1-3 Ha.	129	120
3-5 Ha.	116	98
5-10 Ha.	104	85
Large Farms		
10-15 Ha.	53	66
15-20 Ha.	90	72
20-50 Ha.	56	49
50-100 Ha.	37	28

Figure 23.–Land Use Intensity by Farm Size: Percent of Land in Farm Cultivated

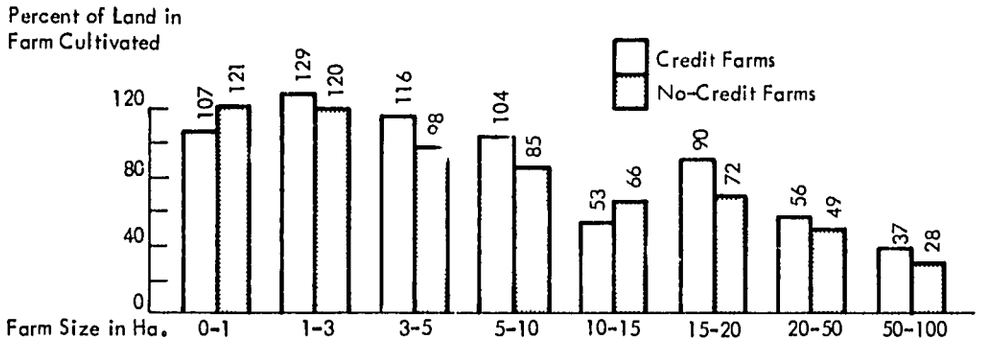


Table 60.–Land Use Intensity by Farm Size: Percent of Arable Land Cultivated

	Credit Farms	No-Credit Farms
Small Farms		
0-1 Ha.	115	125
1-3 Ha.	138	130
3-5 Ha.	131	111
Large Farms		
10-15 Ha.	78	85
15-20 Ha.	103	85
20-50 Ha.	70	67
50-100 Ha.	43	41

2. Credit Impact on Use of Other Modern Inputs

We have looked at the apparent strong impact of credit on increasing the intensity of land use, we now turn to other possible intermediate impacts, and look at modern inputs (fertilizer and chemicals, seeds, machinery), and labor. The differences noted in Table 61 are impressive on a percentage basis. The approximate Q3 difference between the no-credit farms and credit farms of up to Q350 levels of credit represents an increase of about 18 to 23 percent in the value of fertilizers per ha. cultivated. The two highest credit groups use 46 and 56 percent more than the non-BANDESA group. Table 62 indicates that the large farms use well under half as much fertilizer as small farms, and that the differences between the credit and no-credit farms in this group is varied. This variation is probably due to the relatively small number of observations. Some large credit farms appear to be making increased fertilizer use as result of the additional funds.

Machinery is another of the modern inputs which credit farmers might be expected to purchase as a result of the credit infusion. Table 63 indicates the animal and mechanical intensity of cultivation for small farms by level of credit used

Given that the maximum farm size in the small farm group is 10 hectares, the maximum average value of machinery and/or equipment owned per farm is Q249.

Figure 24.–Land Use Intensity by Farm Size: Percent of Arable Land Cultivated

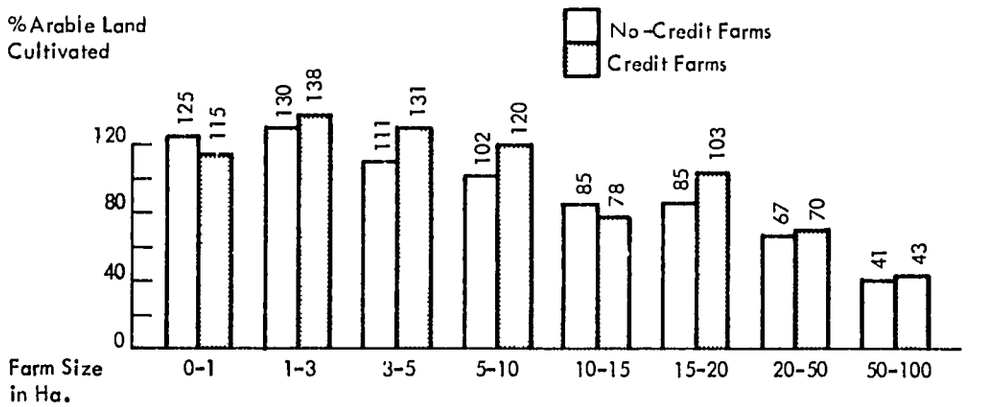


Table 61.–Use of Fertilizer by Level of Credit Use (Including Other Chemicals), Small Farms

	Level of Credit Used in Q					
	0-100	100-250	250-350	350-500	500+	None
Q of Fertilizer per Ha. Cultivated	20.9	20.3	20.1	24.9	26.6	17.0
Index of Use	123	119	118	146	156	100

Table 62.–Use of Fertilizer by Level of Credit Use, Large Farms

	Level of Credit Used in Q					
	0-250	250-500	500-1000	1000-5000	5000+	None
Fertilizer used in Q/Ha.	8.3	9.9	6.0	11.5	6.3	6.6
Index of Use	126	150	91	174	95	100

Table 63.–Mechanical and Animal Power Intensity of Cultivation by Level of Credit Used, Small Farms

	Level of Credit Used in Q					
	0-100	100-250	250-350	350-500	500+	None
Value of Machinery owned/Ha. cultivated Q/Ha.	na	4.50	.21	.52	24.9	3.8
Q of Animal power serviced paid/Ha. Cultivated	.36	2.43	2.90	1.65	1.30	1.98

Table 64.–Mechanical and Animal Power Intensity of Cultivation by Level of Credit Use, Large Farms

	Level of Credit Used in Q					
	0-250	250-500	500-1000	1000-5000	5000+	None
Value of Machinery owned/Ha. Cultivated	.82	.65	14.57	29.70	71.87	18.94
Q of Animal power services paid per Ha. Cultivated	1.3	.53	.27	.65	2.7	.28

This would include plows, harrows, and hand or animal operated equipment. These farms had an average of 6.5 hectares in cultivation and an average of Q937 borrowed for agricultural production. If all of the difference in mechanical intensity of the credit group were financed by the credit received, machinery inputs would account for 15% of the loan. (See Table 63 for the relationships mentioned in this and the following paragraph.)

The absolute differences in expenditures on animal power are relatively small. The percentage differences are rather large but do not exhibit any specific pattern with respect to loan size and/or machinery expenses per hectare.

From Table 64 it would appear that the farmers with additional amounts of credit are in fact operating at much higher levels of mechanical intensity. The farms in the larger loan categories are also the larger size holdings, and one might wonder if the differences which look so dramatic in this table might be more differences between the mechanical intensity of different size farms (i.e.,

larger farms are more mechanical) and not so much differences between credit and no credit holdings. In this light it should be remembered that the size range is many times larger for the large farms than it was for the small farms. Note that the relationship of animal power expenditure is just the opposite of the small farms.

3. The Difficulty with Fungibility of Credit and a Summary of Input Use Performance

The last few pages have focused on the differences in input use by the farms with different levels of credit in an attempt to infer intermediate impacts for the credit. In the farm-business and family situation, credit has four principal destinations:

1. Purchase of capital goods.
   - Machinery, equipment, implements
   - Animals
2. Payments for variable cost goods and services.
   - Labor
   - Fertilizers & other chemical inputs
   - Other (including seeds, materials, marketing costs, fees, etc.)
3. Purchase or rental of land.
4. Non-farm expenditures.
   - Home, buildings
   - Consumption items

One of the principal problems of analyzing the impact of credit is that credit is only added purchasing power to obtain inputs, which in turn have the impacts we wish to measure. The first task from an analytical point of view is to estimate how the credit was used. This task is made doubly difficult because of the fungibility of cash at the farm level. The farmer, if asked what he did with the credit may not be able to respond correctly because cash may be drawn from some other use to complement the credit purchases and the farmer may very well not know himself what the net impact of the additional credit is on the volume of his various types of purchases.

In addition to the different credit destinations by type of purchase, the credit use should also be separated between two general classes of use:

1. Increasing the amount of land under cultivation without increasing the amount of input per hectare cultivated. This type of expenditure we will call "expansion" at current technology or input intensity.
2. Increasing the amount of inputs used per hectare cultivated. This use will be called increasing input "intensity". This implies a changing pattern of input proportions and hence altered "technology".

Tables 57-64 have attempted to indicate input use differences between farms receiving different amounts of credit and differing farm sizes. The conclusions of those tables is that credit appears to have made important differences in the amount of land cultivated, that is increased expansion, and use of purchased inputs. Since farm size seems to determine so many of the observed trends, careful observation of these tendencies holding farm size constant would be advisable, as is indicated in Tables 59 and 60.

D. A COMPARISON OF CREDIT AND NO-CREDIT FARMS

Two additional methods will be used to attempt to get a better feeling for the input purchase designation of credit. The second and most direct of these will draw upon the farmer's response to the question, "how much additional credit could you use and how would you use it?" The first is more complex and requires some prior explanation. The sample drawn for this study attempted to match the credit recipients to farms with similar characteristics but without credit. The objective of this sampling technique was to allow direct comparisons between the performance of the credit and no-credit farms. In this section we proceed to make the principal use of that comparison mechanism. Out purpose here is to estimate what intermediate effects the credit had on the purchase of different inputs. We should keep in mind that identifying the purchases to which loans were apparently applied is not the same as identifying the impacts of those funds on our final objectives. We will assume that the no-credit farms represent the average way of producing for that farm size. Given the apparent importance of farm size we will hold that constant in our comparisons to eliminate differences which may come from differing farm sizes.

Table 65 outlines in summary the results of this comparative search for the apparent use of loan funds. The figures in this and following tables are addressed to the following issue.

1. Differences in Purchases of Inputs Between Credit and No-Credit Farms

In order to properly interpret the results displayed in Table 65 we must understand exactly how they were calculated. The 3-5 ha. farm size group which averaged Q376 per loan will be used as an example to explain how

Table 65.–Apparent Loan Use by Farm Size

	Average size of loan Q	% of loan explainable by added variable cost expenditures	% of loan explainable by added capital goods	% of loan with unexplainable destination
Farm Size				
Small Farms				
0-1 Ha.	279	95%	36%	-31%*
1-3 Ha.	355	52%	5%	28%
3-5 Ha.	376	53%	13%	34%
5-10 Ha.	544	61%	7%	32%
Large Farms				
10-20 Ha.	728	13%	48%	39%
20-50 Ha.	1103	82%	0	18%
50-100 Ha.	2581	66%	13%	21%

*The negative 31% in this entry indicates that these farms appeared to have made increased variable and capital goods uses 31% in excess of this loan. This may have been a sampling error, or these farms may have obtained additional money from informal or unreported sources.

the data were derived. A comparison of variable cost expenditures of the credit and no-credit farm group in this farm size indicates that the credit farms purchases of these items averaged Q199 more than the no-credit group. If it is assumed that this difference is due to receipt of loan funds (or with funds freed for alternative use) then 53% of the average loan for this farm size group is attributed to variable input purchases. The same procedure is used to estimate the percent of the loan used to purchase additional capital goods and the remainder is considered unexplainable. This approach to estimating final credit use has the advantage of looking behind the problem of fungibility of funds at the farm level. If the farmer actually purchases more fertilizer as a result of the loan, we should not care if the check which he received from BANDESA was used to pay for a home improvement, and funds which he had set aside for the home improvement were later used for fertilizer. The reverse case also happens and this technique should allow us to identify when loan funds are used directly for the purchase of an input like fertilizer, but the purchase is not "additional" and funds which were normally used for fertilizer have been used to make an "additional" home improvement. The weakness of the technique is in the accuracy of the sampling procedure. If the credit is the only major difference between the farms, the method should give useful and reasonable reliable results. The pattern indicated in Table 65 shows a heavy bias in loan use toward variable cost expenditures. Only one farm group (10-20 ha.) appears to have increased capital expenditures more than variable cost additions. In general it can be said that loan farms *do* increase their purchases of agricultural inputs and that these observable increases over comparable farms in similar size groupings would explain 2/3 and 3/4 of the loan use. The smallest farm size grouping experienced additional purchases which would explain 131% of the loan, a strange conclusion, because one would expect this group to be the *least* able to complement institutional loan funds from other sources.

The final use of the remaining 25-35% may be inferred from production cost data collected by BANDESA. According to this source, these funds are spent on labor for manual operation such as land preparation, seeding, maintenance, harvesting, etc.

The heavy bias of the explained credit use toward variable cost purchases supports the notion that the farms are intensifying and expanding their cultivated areas. This hypothesis is tested in the tables which follow, however, and the results there appear to confirm this idea and most of its ramifications. There appears to be no important differences by farm size in the proportion of credit used for capital and variable expenditures. I would have expected the larger farms to have expended a much larger portion of their funds on animal and machinery purchases.

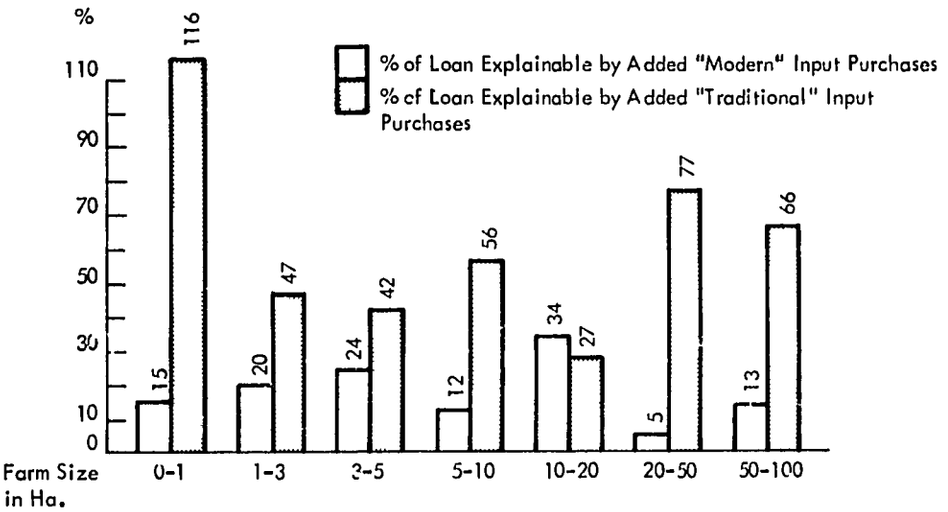
2. Modern Inputs Used According to Credit Use and Farm-Size

Table 66 and Figure 25 present the uses of credit according to the percent of the loans explainable by the various "modern" and traditional input categories. Machinery and chemical inputs are identified as

Table 66.–Loan use Explainable by Additional Purchase of Modern and Traditional Inputs, by Farm Size

	% of loan explainable by added "modern" input purchases	% of loan explainable by added "traditional" input purchases	% of explainable purchases which were modern
Farm Size			
Small Farms			
0-1 Ha.	15%	116%	11.4%
1-3 Ha.	20%	47%	29.8%
3-5 Ha.	24%	42%	36.3%
5-10 Ha.	12%	56%	17.6%
Large Farms			
10-20 Ha.	34%	27%	55.7%
20-50 Ha.	5%	77%	6.0%
50-100 Ha.	13%	66%	16.4%

Figure 25.–Loan Use Explainable by Additional Purchase of Modern and Traditional Inputs, by Farm Size



"modern", with labor, animals, and other variable inputs as "traditional". The chemicals category includes fertilizers, pesticides, herbicides, fungicides, drugs and other chemicals used in livestock. These groupings are less than exact since some of the "other" inputs may be "modern" like improved seeds, and some of the "modern" inputs may be very traditional like organic fertilizers. It would appear from Table 66 that the loan uses on all farms would have to be characterized as being mostly for traditional inputs. Only one farm group (10-20 ha.) spends as much as 1/2 of the explainable loan on modern inputs. The most striking conclusion from this table, however, is that small farms are easily as modern input oriented as the large farms. The "field experience" view of this small farmer characterized him in two words: "traditional" and "subsistence". By traditional it was meant that they seemed to use traditional inputs and would continue to do so. This table appears to contradict the "traditional" part of the normal characterization. Table 66 was not presented here in the belief that the characterization of some inputs as "modern" and others as "traditional" has some significant policy implication (I would argue that the dichotomy itself is rather useless), but rather to test the validity of the current generally held view of small farmers as "traditional subsistence" operators. We should be reminded that whether an input is "modern" or "traditional" matters little, our objectives do not include "modernization" for modernization's sake.

Table 67 and Figure 26 indicate the distribution of the explainable portions of the loan by the input type additionally purchased.

Table 67.—Loan Use Explainable by Additional Purchases by Farm Size and Input Type

	Percent of total loan which is explainable by additional purchases of each input group:					
	Machinery	Animals	Labor	Chemicals	Other	Unexplained
Farm Size						
Small Farms						
0-1 Ha.	2%	34%	11%	13%	71%	–31% over explained
1-3 Ha.	5%	0	12%	15%	35%	33%
3-5 Ha.	13%	0	14%	11%	28%	34%
5-10 Ha.	7%	0	21%	5%	35%	32%
Large Farms						
10-20 Ha.	24%	24%	–3%	10%	6%	39%
20-50 Ha.	0	0	23%	5%	54%	18%
50-100 Ha.	13%	0	27%	0	39%	21%

Figure 26.—Loan Use Exp'ainable by Additional Purchases by Farm Size and Input Type

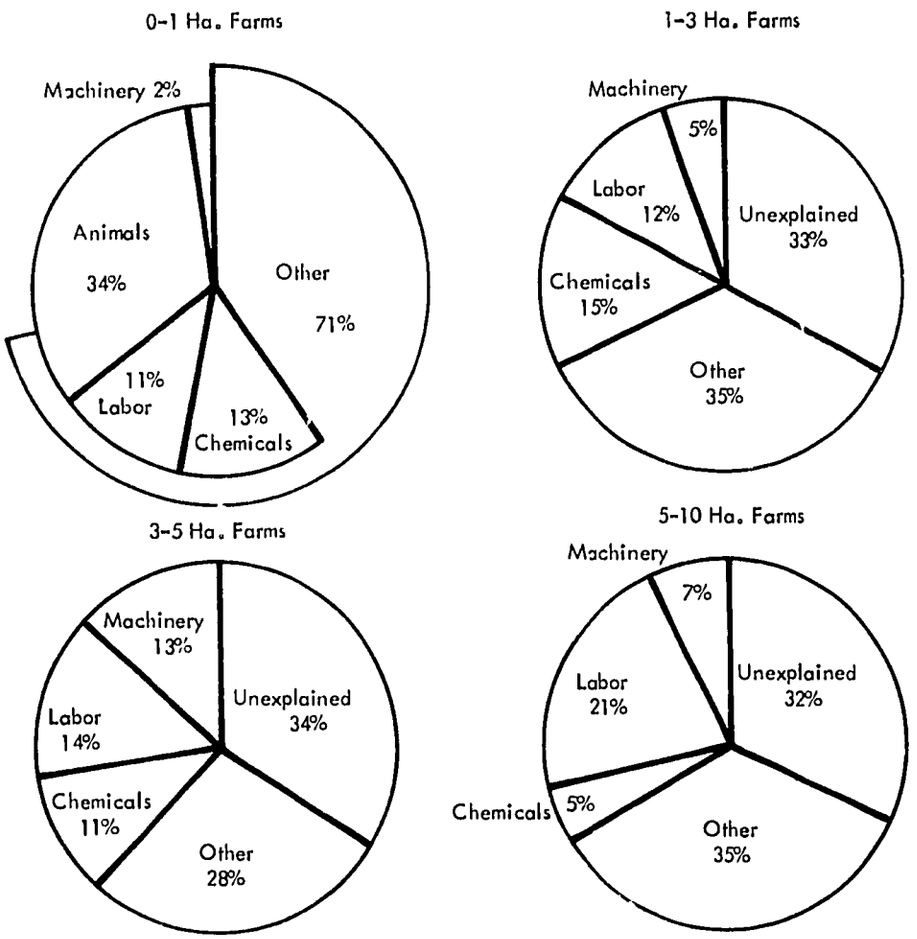
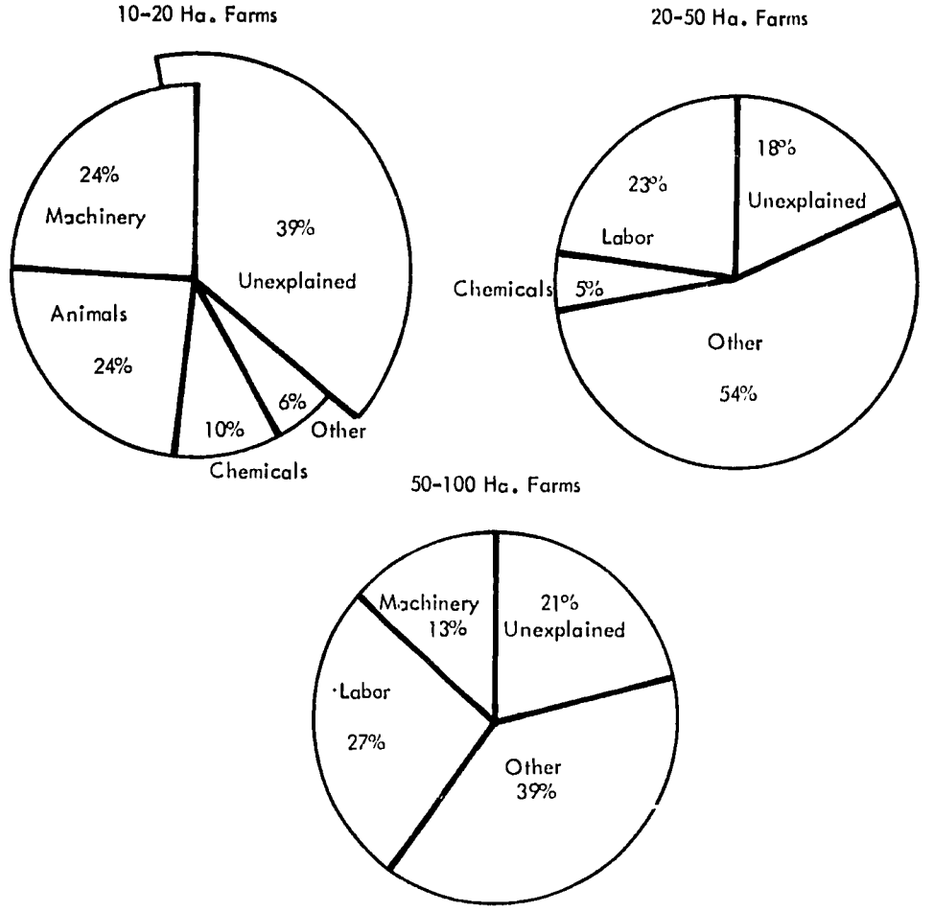


Figure 26.—Loan Use Explainable by Additional Purchases by Farm Size and Input Type—Cont'd



3. Machinery

Only slight increases in machinery appear to have been caused by the credit. In Table 64 it appeared that those farms using substantial amounts of credit used more machinery per hectare cultivated. However, the data in Table 67 indicate that this relationship is closely correlated to farm size. Note that 3 of the 4 small farm size categories increased their use of machinery by less than 10 percent. The larger farms that have a relatively large stock of machinery and equipment used less than one fourth of their funds for additional machinery. The largest increase in machinery use was in the 10-20 hectare group; the lowest in the 0-1 hectare group. It is interesting to note that only the two smallest size groups in each farm category used additional animal power.

From the above it appears that probable use of loan funds for animals is less than for machinery. Only 8 percent of the farms increased animal use compared to 80 percent for machinery.

4. Fertilizer and Chemicals

Farm size credit groupings making up 99% of those sampled, used loan funds to increase purchase of inputs in this category. The increases ranged from 18 to 56%. The smallest of the sample group (9 farms) and the rather imprecise method of estimation, however, leave us uncertain about the implications of this finding. The consistency of chemical input purchase among credit farms is matched by a consistently small portion of the loan funds which may be accounted for by chemicals. The range is only from 5-15% with the large farms at the lower end of the range.

Like most residuals, our "other" category is large and very difficult to identify. It is worth noting that land costs are not in the residual. Land costs (rental or imputed minimal return to owned land) would have been included as one of the possible destinations of loan funds. The calculation, however, indicated that none of the credit groups had increased their value of land

owned, or rented extra land as compared with the control group. The land column, therefore, does not appear in Table 67 because its entries would all be zero. The labor input presents special interpretative meaning since it is the only input which is an objective in itself. Because the labor impact is to be treated as one of our final performance criteria (as opposed to the intermediate impacts we are observing in this part of the discussion) the interpretation of the labor column in Table 67 will be left until later.

E. THE USE OF LOANS TO INTENSIFY CULTIVATION vs. THEIR USE FOR EXTENDING THE AREA CULTIVATED

In this section our attention is focused on another dimension of the intermediate impact of the credit funds, the degree to which the credit caused a change in the quantity and proportions of inputs per hectare cultivated, and the degree to which the credit only expanded the area under cultivation using the same basic quantities and proportions on inputs per hectare. Almost all of the credit farms appear to have done both at the same time, that is they have both intensified the quantities of inputs used on a cultivated hectare and increased the area under cultivation. In order to attempt to separate the proportional impacts of loan funds and of inputs purchased we will again use the control group as our basis for comparison. We will assume the control group to represent the average no-credit production process; it will represent the stable quantity of inputs used without credit. We will compute the portion of the explainable loan purchased input which went to extend the area cultivated by assuming the same input pattern as the control group for the added area cultivated by the credit farms. Farm size will be held constant in these calculations in order to avoid comparing different sized farms and to limit the range in the basic assumption of the input quantities per hectare to farms of similar size. That is we will assume that the 3-5 ha. no-credit farm defines the no-credit or pre-credit technology or input quantity and proportion pattern. Were we willing to assume that the prices paid for the inputs in the base group represented the marginal revenue product for each of those inputs, we might be inclined to construct productivity indices similar to those of John Kendrick.[1] "Kendrick" indices divide up, that is attribute, the output in the base year to each of the inputs (that is output "caused" by each of the inputs) in the proportion which their costs are of total costs. In that way he is able to attribute changes in technology over time or cross sectionally by attributing the excess or production not accounted for by increasing inputs. Agriculture in transformation with very poor factor markets is by definition not in equilibrium and we would not expect their marginal cost to equal their marginal revenue product factors. For the purpose of this draft we will bypass the problem of attribution of changes among the inputs.

1. Extension of Area Cultivated

Our central focus in the discussion which follows is to estimate what portion of the loan funds was apparently used for (or caused by) extending the area under cultivation, and what portion was used to intensify the input quantities per hectare cultivated. Table 68 and Figure 27 present the summary of all of the inputs.

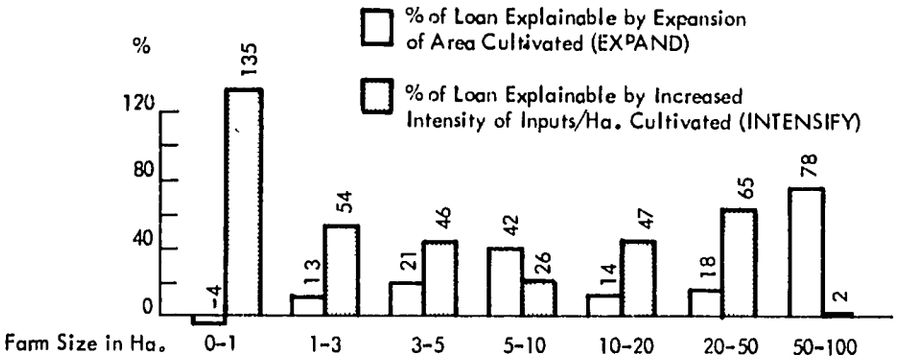
Table 68 presents trends for the small farm groups which appear easy to interpret, but the large farm

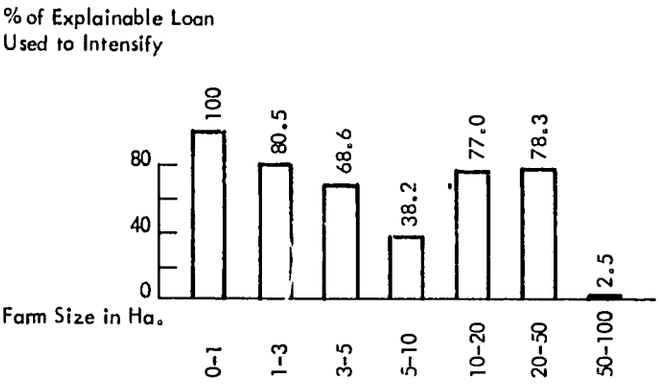
[1] John W. Kendrick, *Productivity Trends in the United States*, National Bureau of Economic Research. Princeton University Press, 1961.

Table 68.—The Proportion of Explainable Loan Use to Expand Cultivation or to Intensify it

	% of loan explainable by expansion of area cultivated (EXPAND)	% of loan explainable by increased intensity of inputs/Ha. cultivated (INTENSIFY)	% of explainable loan used to intensify
Farm Size			
Small Farms			
0-1 Ha.	–4%	135%	100%
1-3 Ha.	13%	54%	80 5%
3-5 Ha.	21%	46%	68.6%
5-10 Ha.	42%	26%	38.2%
Large Farms			
10-20 Ha.	14%	47%	77.0%
20-50 Ha.	18%	65%	78.3%
50-100 Ha.	78%	2%	2.5%

Figure 27.–Proportion of Explainable Loan Use to Expand Cultivation or to Intensify It





pattern (if there is a pattern) is confusing. The smallest farms (0-1 ha.) absorb all of their explainable funds in intensifying, that is increasing the quantities of inputs used on each hectare cultivated. The credit farms in this group even reduce slightly their cultivated area. From this 100% intensity value, the larger the small farm the more of their loan funds are used for expanding their cultivated area. The trend is even and consistent. The 5-10 ha. farms are devoting about one third as much of their loan resources to intensification as are the 0-1 ha. farms. This would appear to coincide with the results displayed in Table 60 where the % of arable land cultivated is presented for the various farm sizes. There is an obviously decreasing trend of percent of arable land cultivated as farm size increases. We would expect the larger farm to be able, therefore, to more easily find arable land to cultivate, and dedicate a larger portion of its loan funds to that end. If we compare the results in Table 68 with those of Table 60, we are able to see the process of expansion in a way which fits both logic and the data available. What is dissonant and confusing is the apparent loan use performance of the farms over 10 ha. Since they have considerable surpluses of arable land uncultivated, one would have expected them to have continued the trend so evenly followed by the small farms of applying a larger portion of the loan funds to expand the area cultivated. Instead, the two large farm groups (10-20 ha. and 20-50 ha.) which represent 93% of all large farms and 23.6% of all farms sampled, break the trend. Their intensity characteristics are about the same as the 1-3 ha. groups. This could be understood if the investments of this group were basically animal power. As you will recall from Table 67, however, only 24% of the loan of only one of these groups was explainable as purchases of animal power. In the other two large groups none of the loan value was explainable as increased animal power. In this light it should be remembered that the smallest farm group had the highest loan use for animal power with only a slight decrease in cultivated area.

Though the number of farms in the largest class that was included in the sample was small (nine farms), the

Table 69.—Loan use for Capital Goods Purchase: By Farm Size and Expansion or Intensification Category

	% of loan used for capital goods to expand cultivation	% of loan used for capital goods to intensify cultivation	% of capital goods increase to intensify cultivation
Farm Size			
Small Farms			
0-1 Ha.	0	36%	100%
1-3 Ha.	0	5%	100%
3-5 Ha.	0	13%	100%
5-10 Ha.	2%	5%	71.4%
Large Farms			
10-20 Ha.	2%	46%	95.8%
20-50 Ha.	0	0	0
50-100 Ha.	16%	−3%	0

percent of farms in that size class in the country which were sampled is probably the highest for any group in the sample. Unfortunately, we expect the variance for these large farms to be greater and hence to require a much larger sample to obtain reliable data. With these caveats, it should be noted that this largest group returns to what we would expect to be their behavior on land use and loan use. For this 50-100 ha. group, the percent of explainable loan use to intensify was only 2.5%. It appears therefore that the mid-sized farms between 10 and 50 ha. are the only group not acting as we would expect.

Though the last paragraphs indicate surprise at the dissonance of the larger farms, it is that very dissonance which has been the basis of much of the literature of land reform. At least a part of that thesis appears to be supported by the data displayed in Tables 60 and 68. The supportive conclusion might be stated as follows:

a. For all size groups, increasing farm size without credit is accompanied by a lower percent of arable land cultivated.
b. For a subset of farms in the mid-range (10-50 ha.) added credit appears not to be used to alter this tendancy. Farmers use most of their credit to intensify their production rather than to extend.
c. Except for those groups, the other farms, while demonstrating the tendency without credit to cultivate less of their arable land as farm size grows, with credit devote larger and larger percents of that money to expanding their cultivation.

For a country like Guatemala with a seriously limited arable land base, these tendencies are of utmost policy import.

2. Intensification Through Mechanization

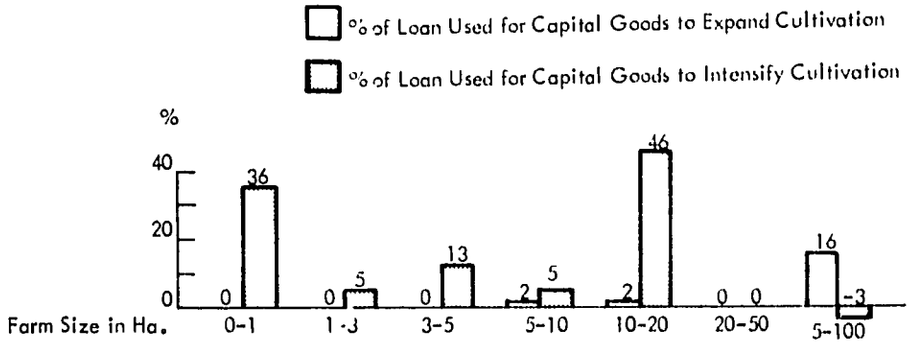
The following two tables present the role of capital and annual cost inputs in intensification and extension of cultivation for the credit farms. These two tables represent the first in a series of tables which progressively disaggregate the general classes of durable and annual inputs into their components in order to identify the important differences which are observable only when the input category covers a more homogenous set of items.

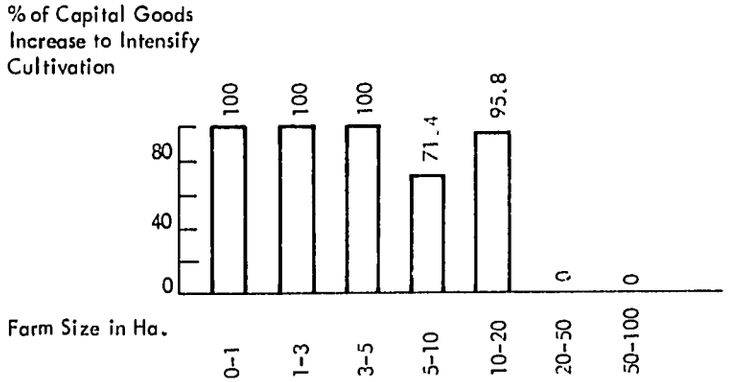
When Table 69 and Figure 28 are viewed in conjunction with Table 70, it is clear that the loan use for machinery among small farms is overwhelmingly in favor of intensification, mostly because there is almost no machinery involved in expansion. Some machinery is implicit in expansion in the larger units since even the pre-credit (no-credit) mechanical intensities are fairly high.

Table 70.—Mechanical Intensity of Cultivation by Farm Size and Credit Group

	Value of Machinery per Ha. Cultivated	
	No-Credit Farms	Credit Farms
Farm Size		
Small Farms		
0-1 Ha.	1.3	8
1-3 Ha.	4.0	10
3-5 Ha.	0.8	11
5-10 Ha.	6.0	10
Large Farms		
10-20 Ha.	18	31
20-50 Ha.	72	49
50-100 Ha.	45	43

Figure 28.—Loan Use for Capital Goods Purchase: By Farm Size and Expansion or Intensification Category





The increasing mechanical intensity of cultivation with increasing farm size is observable in Tables 71 and 72 and Figure 29. These two tables taken together indicate that machinery expenditures resulting from credit are almost exclusively for intensification of mechanical input per hectare on all but the largest farms.

In order to place the mechnical intensity figures in perspective, Table 71 indicates comparable figures for a number of developed countries. These figures would be higher if only cultivated land were included. It is interesting to note that the large farms in the sample are reasonably well endowed with mechanical capital goods by comparison with the U S. but much less than the other countries included.

Table 71.—Value of Machinery and Equipment per Hectare US$/Hectare

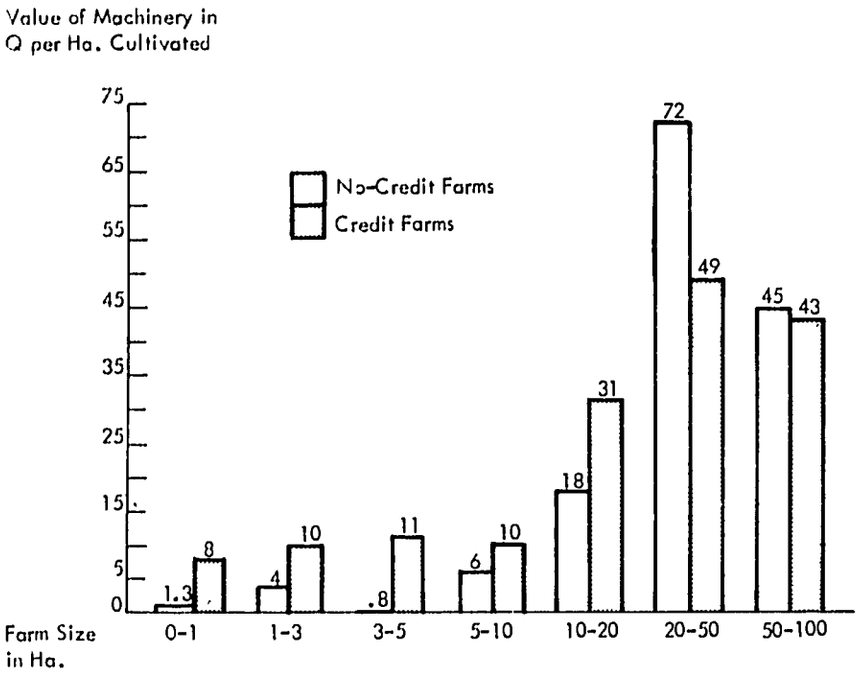
Norway	209
Germany	383
Japan	348
Ireland	36
United States	62
Switzerland	384

Source: OECD, *Capital and Finance in Agriculture,* 1970, Paris.

Table 72.—Animal Intensity of Cultivation by Farm Size and Credit Type

	Value of Animals per Ha. Cultivated	
	No-Credit Farms	Credit Farms
Farm Size		
Small Farms		
0-1 Ha.	49	144
1-3 Ha.	168	164
3-5 Ha.	443	245
5-10 Ha.	645	637
Large Farms		
10-20 Ha.	1102	1274
20-50 Ha.	5202	3060
50-100 Ha.	7162	5486

Figure 29.–Mechanical Intensity of Cultivation by Farm Size and Credit Group



3. Intensification through Increased Animal Use

Table 72 presents the animal intensity of cultivation and completes the presentation of capital goods in credit use. It is interesting to note that the credit farms appear not to have made animal purchases with their credit since the animal intensity does not indicate levels for the credit farms in nearly the same consistent way or with similar magnitudes as does the machinery figures in Table 70. The quantities of animal value as compared with machinery for all groups demonstrates the high portion of capital held in animal forms on all Guatemalan farms. The importance of livestock activities on larger farm units will be seen in the crop and commodity level accounts treated in later documents.

4. Purchases of Non-Durable inputs ofr Extension vs. Intensification of Cultivation

We turn now to the consideration of the role which loan-induced purchases of non-durable inputs play in extension or intensification of cultivation. Table 73 outlines the expansion or intensification of annual or variable cost items as a group. The trend in Table 73 and

Table 73.–Loan Use for Non-Durable Inputs by Farm Size and Expansion or Intensification Category

	% of loan used for non-durables to expand cultivation	% of loan used for non-durables to intensify cultivation	% of non-durable additional purchases to intensify cultivation
Farm Size			
Small Farms			
0-1 Ha.	–4%	99%	100%
1-3 Ha.	13%	49%	79%
3-5 Ha.	21%	33%	61%
5-10 Ha.	40%	21%	34%
Large Farms			
10-20 Ha.	12%	1%	8%
20-50 Ha.	18%	65%	78%
50-100 Ha.	62%	5%	8%

Figure 30.–Loan Use for Annual Cost Inputs by Farm Size and Expansion or Intensification Category

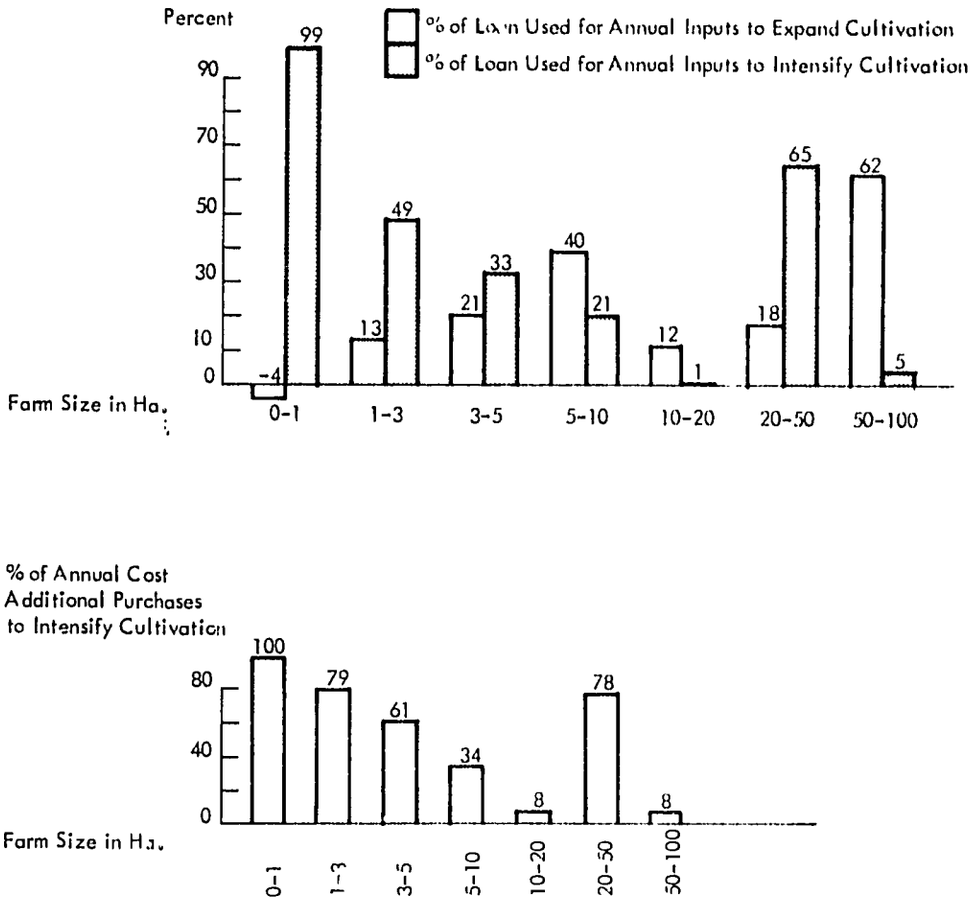


Figure 30 is similar to that in Table 68 and accounts in large part for the pattern in that table. The trends in Table 73 and Figure 30 carry the same interpretative meanings outlined in the discussion of Table 68. We will next treat the component inputs which make up the non-durable category. These inputs have been grouped into three categories:

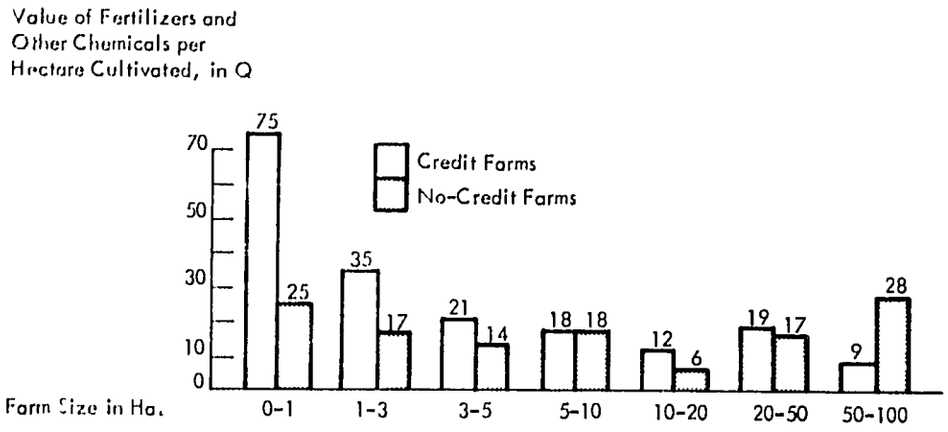
- Chemicals including fertilizer
- Labor (hired only)
- All other non-durable inputs

The labor component, as we have mentioned earlier, will be treated as an objective and an input in the discussion which deals with final impact measurements of the three objective criteria of net income, food production and employment. The residual "other inputs" is uninteresting from a policy point of view partly because we are unwilling to disagreggate it in multitudinous parts, and partly because as a group they follow the general trends and patterns associated with the aggregate non-durable category.

5. Specific Fertilizer Use Patterns

We are left with chemicals as the only annual input category for which the expansion and intensification coefficients are to be presented. While all chemicals are included in this category, it should be remembered that fertilizers account for the large majority of these expenses. Fertilizers are so much associated in the literature with modernization of agriculture that our findings on the credit impact for this input will be of particular interest. Generally it is felt that increased fertilizer application is a better way to improve agricultural production than perhaps any other single suggested solution. It is also part of the general wisdom about small farmers that their subsistence and traditional technology would be substantially altered if they could be con-

Figure 31.–Chemical Intensity of Cultivation



vinced to increase their fertilizer applications to be more in line with the commercial or larger farm sub-sector.

Table 74 and Figure 31 present the chemical intensity of cultivation for the credit and no-credit farms by size of holding. The first column in Table 74 indicates the decreasing intensity of fertilizer use with increasing farm size for the credit farms. The credit farms apply almost twice as much fertilizer as their comparable no-credit farms for the smallest three farm sizes.

F. CREDIT USE ACCORDING TO MAJOR PRODUCTION CATEGORIES

An analysis of the principal use of credit as reported by the farmers reveals that the loan funds were used for various groups of products. These are presented in Table 75. A short summary of each basic group follows.

The data in Table 76 gives the breakdown of credit use by farm size and type of activity. All cattle, beef, dairy and double-purpose livestock have been grouped together. Cattle accounted for about two thirds of the credit used in this group.

Table 77 gives a breakdown of credit used for basic grains and oil seeds. The major product is corn, which received 39 percent of all the BANDESA credit and four times more than wheat, ten times more than rice, five times more than beans and thirty-five times more than sorghum. This group accounts for almost two thirds of the credit used by the BANDESA group.

Only two oilseed crops were observed in the BANDESA sample, sesame and peanuts.

The data for temporary and permanent crops are presented in Table 78. Crops that are listed on the BANDESA crop diversification loan summary data sheets are noted as such in the table below. No crop that had a separate total less than Q30,000 in credit was listed separately in this group. Within the permanent crop group, bananas and oranges account for about 70 percent of the credit used.

Tomatoes are the major temporary crop in this group and one of the more profitable. Flowers, which is one of the most profitable crops and probably the most labor

Table 74.–Chemical Intensity of Cultivation

	Value of Fertilizers and other Chemicals per Hectare Cultivated (in Q/Ha.)	
	Credit Farms	No-Credit Farms
Farm Size		
Small Farms		
0-1 Ha.	75	25
1-3 Ha.	35	17
3-5 Ha.	21	14
5-10 Ha.	18	18
Large Farms		
10-20 Ha.	12	6
20-50 Ha.	19	17
50-100 Ha.	9	28

Table 75.–Loan Use by Product Groups

Product Group	Approx. % of Total Loan Fund
Livestock, Poultry, Other Animals	6
Basic Grains	62
Temporary Crops	14
Oil Seeds	6
Permanent Crops	11
Other Uses	1
	100

intensive, received about 2 percent of the total credit as estimated from the sample and received about half of the credit in this group.

Data on credit used for inputs is given in Table 79. Note that very few farmers indicated that they used credit for specific inputs. Note that the major inputs are chemicals.

The distribution of credit between farm sizes is given in Table 80. Note that almost 56% of the credit was extended to farms of less than 10 hectares.

Table 76.–Credit Used for Livestock and Poultry by Farm Size (Weighted)

(Values in Q1000)

	Farm Size in Hectares						
	less than 10		10 and greater				
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Used
Dairy & Beef	20	6	52	113	72	119	3.73
Poultry	21	69	0	0	21	69	2.16
Other	1	---[1]	0	0	1	---[1]	---[2]
Total[3]	42	75	52	113	94	188	5.90

[1] Less than Q500.
[2] Less than 0.005.
[3] Totals may not sum due to rounding.

Table 77.–Credit Used for Basic Grains and Oilseed by Farm Size (Weighted)

(Values in Q1000)

	Farm Size in Hectares						
	less than 10		10 and greater				
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Used
BASIC GRAINS							
Wheat	1132	262	179	83	1311	345	10.79
Corn	2335	586	1020	664	3355	1250	39.17
Rice	139	58	151	68	290	126	3.95
Sorghum	30	6	44	29	74	36	1.11
Beans	687	124	185	110	872	234	7.34
Total[1]	4323	1037	1579	954	5902	1991	62.38
OIL SEEDS							
Sesame	320	79	200	96	520	175	5.47
Peanuts	1	---[2]	3	1	4	1	.02
Total[1]	321	79	203	97	524	176	5.50

[1] Totals may not sum due to rounding.
[2] Less than Q500.

Table 78.–Credit Used for Permanent and Temporary Crops by Farm Size (Weighted)

(Values in Q1000)

	Farm Size in Hectares						
	less than 10		10 and greater				
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Used
Permanent crops							
Banana	44	71	26	81	70	151	2.93
Oranges	39	39	13	54	52	94	2.93
Avocado	7	9	10	21	17	30	.94
Peaches	10	41	0	0	10	41	1.27
Others	104	22	9	12	112	34	1.07
Total[1]	204	182	58	168	262	350	10.96
Temporary crops							
Onions	70	15	20	8	90	23	.71
Potatoes	164	40	36	6	200	46	1.43
Garlic	72	29	3	3	75	32	.99
Tomatoes	280	127	50	27	330	155	4.84
Others	241	56	0	0	241	56	1.74
Total[1]	827	267	109	44	936	311	9.74
Temporary crops							
Flowers	31	67	0	0	31	67	2.08
Tobacco	17	116	9	16	26	28	.86
Others	117	45	34	13	151	57	1.80
Total[1]	165	123	43	29	208	152	4.75

[1]Totals may not sum due to rounding.

Table 79.–Credit Used for Other Inputs by Farm Size (Weighted)

(Values in Q1000)

	Farm Size in Hectares						
	less than 10		10 and greater				
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Used
Chemical inputs	81	20	0	0	81	20	.62
Labor	4	2	0	0	4	2	.07
Farm improvement	7	1	0	0	7	1	.03
Housing const.	1	--[1]	0	0	1	--[1]	--[2]
Total[3]	93	24	0	0	93	24	.72

[1,2,3]Same as Table 76.

Table 80.--Total Credit Used by Farm Size

(Values in Q1000)

	Farm Size in Hectares					
	less than 10		10 and greater			
	No. Obs.	Total Value	No. Obs.	Value	Total Obs.	Total Value
Total[1]	5975[2]	1787	2044[2]	1405	8019[2]	3192
Percent		55.98%		44.01%		100%
Total # of farms using credit	4580		1541		6121	
Average per farm in Q		390		912		539

[1]Totals may not sum due to rounding.
[2]The number of observations are greater than the number of farms using credit because some farms received credit for more than one crop.

CHAPTER NINE: DEMAND FOR AGRICULTURAL CREDIT

A. THE CONTEXT OF THE DEMAND ISSUE

1. Land Availability, Food Demand and Problems of Risk

As mentioned in previous chapters, all farm groups appear to have some land available to expand cultivation by multiple cropping or increasing area under cultivation. Thus, land availability does not appear to be a bottleneck in the short run. A later section will treat land availability in more detail.

Aggregate demand for food in Guatemala should increase relatively rapidly given experiences in other countries. The increase in market demand for food in Colombia is estimated at about 5.5 percent annually. Aggregate demand in the United States has grown very little over the last few decades and the quantity of food consumed per capita has actually decreased 14 percent since 1910[1]. By contrast, the growth in aggregate demand for food in Colombia is about 5 times that of the U.S. Guatemala's rate of growth of demand is probably close to that of Colombia. Careful commodity by commodity demand analysis would be an important undertaking at this time to assist in determining how farmer credit programs could be used to meet increased levels of aggregate demand for essential food crops.

In operational programs to provide that credit, concern has been voiced that the small farmers were not as interested in additional credit as the studies said they should be. Much has been said about risk aversion among small and/or subsistence farmers which seems to fit with their alleged unwillingness to undertake loans and extend themselves financially even where possible benefits were demonstrable. This behavior is attributed to the personal disaster that even a slight chance of crop failure would imply at their near survival standard of living. Chapter eight concludes that the importance of this factor has been overestimated.

2. Gross Indicators of Credit Demand

The analysis of credit demand presented in this section is based upon subjective data, that is, farmer intent or interest in additional credit. Given that these farmer responses are subjective, it is recommended that the data be used only as indications of farmer's desires. Remember that there are BANDESA and non-BANDESA farmers in the group desiring additional credit as the sample was composed of equal numbers from each group. Table 81 and Figure 32 illustrate the important differences in expressed credit demand among farmers who had received institutional credit during the last year. Only 26.9% indicated no need for additional credit during the coming crop year. In the group without credit 63% indicated that they did not desire credit. Since farmers in this size group who have had institutional credit are extremely scarce, it is assumed that the no-credit group is more representative of the small farmer population as a whole than the credit group. As of the end of 1974, there will probably be nearly 400,000

[1] USDA Aggregate Food Consumption. Agricultural Economic Report 138, *Food, Consumption, Prices, Expenditures.*

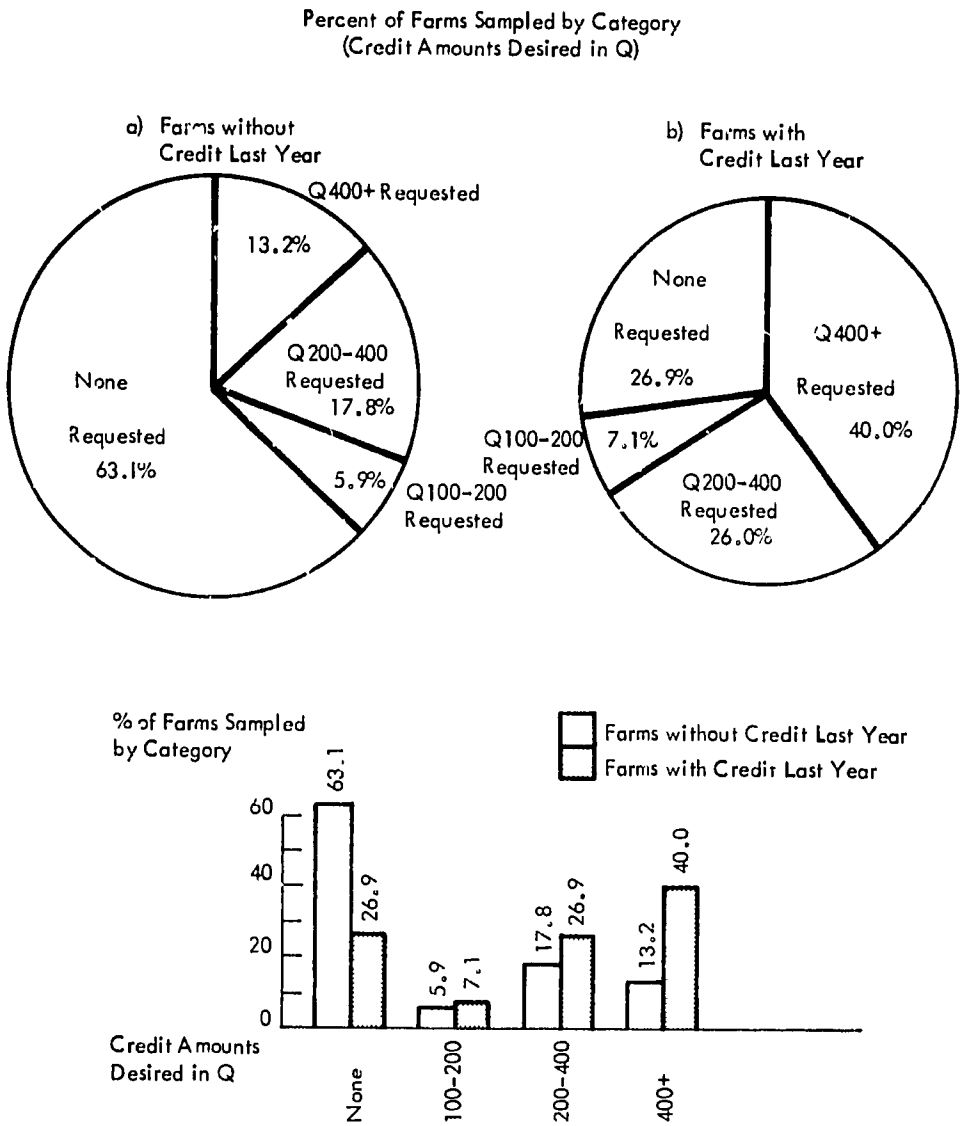
Table 81.—Expressed Demand for Credit Among Small Farmers*

	Credit Amounts Desired in Q			
	None**	100-200	200-400	400+
Percent of farms sampled by category				
a) Farms without credit last year	63.1	5.9	17.8	13.2
b) Farms with credit last year	26.9	7.1	26.0	40.0

*Small Farms are those with less than 10 Ha. in the operated holding.

**The number of observations requesting between Q 1-100 was insignificant and therefore not presented.

Figure 32.–Expressed Demand for Credit Among Small Farmers



farmers with less than 10 ha. in Guatemala. Assuming the responses of the no-credit group to be representative of this universe, then about 148,000 small farmers are currently looking for credit. In order to get a feeling for the rough magnitude of farmer demand for credit, two assumptions will be made about the representative nature of the samples drawn:

a. That the farmers without credit in the last year are representative of the whole small farmer universe
b. That the small farmers with credit last year are representative of future farmers who could be included in credit programs. This demand would be an upper limit on longer term perceived demand after most farmers had received credit, assuming that their reactions to credit are similar to our credit group.

The estimates in Table 82 are based on the responses from Table 81. At this point no effort has been made to estimate how the quantity of demand by farmers with the technological knowhow and resource availabilities to make productive use of the credit. *It is estimated that national small farmer perceived demand for additional credit is around Q56 million.* This follows from a simple expansion of the 1600 sampled farms to a universe of 400,000 and should not be used for more than indications of crude orders of magnitude since the statistical

Table 82.–Estimates of Small Farmer Perceived Credit Demand

	Credit Amounts Desired in Q Per Farm			
	None	1-200	200-400	400+
No. of small farms (based on expansion of no-credit sample)	252,000	24,000	71,000	52,800
Total amount demanded in millions of U.S.$ or Q	0	3.5	24.2	28.5

Table 83.–Intensity of Land Use by Level of Credit Desired

	Credit Amount Desired in Q		
	100-200*	200-400	400+
Average farm size (Ha.)			
No-Credit farms	1.80	2.81	4.17
Credit farms	2.96	3.81	4.41
Cultivated area (Ha.)			
No-Credit farms	1.52	2.97	4.30
Credit farms	3.60	3.85	5.26
% Utilization of Land** (Intensity Index)			
No-Credit farms	84.4	105.7	103.1
Credit farms	121.6	101.0	119.3

*Numbers of farms in the Q1-100 range were were insignificant in these tables.

**Double cropped area is counted twice as cultivated area permitting the index value to go above 100%.

error may be rather large.[1] Fletcher, et. al.,[1] estimated that small farmers were receiving approximately Q5 million of credit annually and that the number of farms involved was probably not much over 10.000. This indicates a gap of immense proportions. If we use farmers who received credit last year as an indication of what annual perceived demand would be, the annual upper limit on perceived demand would be more than double at Q126 million.

B. PROFITABILITY OF CREDIT

The remaining disucssion of the farmer perceived demand for additional credit will attempt to explore the characteristics and performance of the farmers in the various perceived demand categories to get some idea about the credibility of the farmers' statements. The objective of this part of the analysis is to determine if the credit can be productively used at current interest rates and generate an attractive return for the farmer.

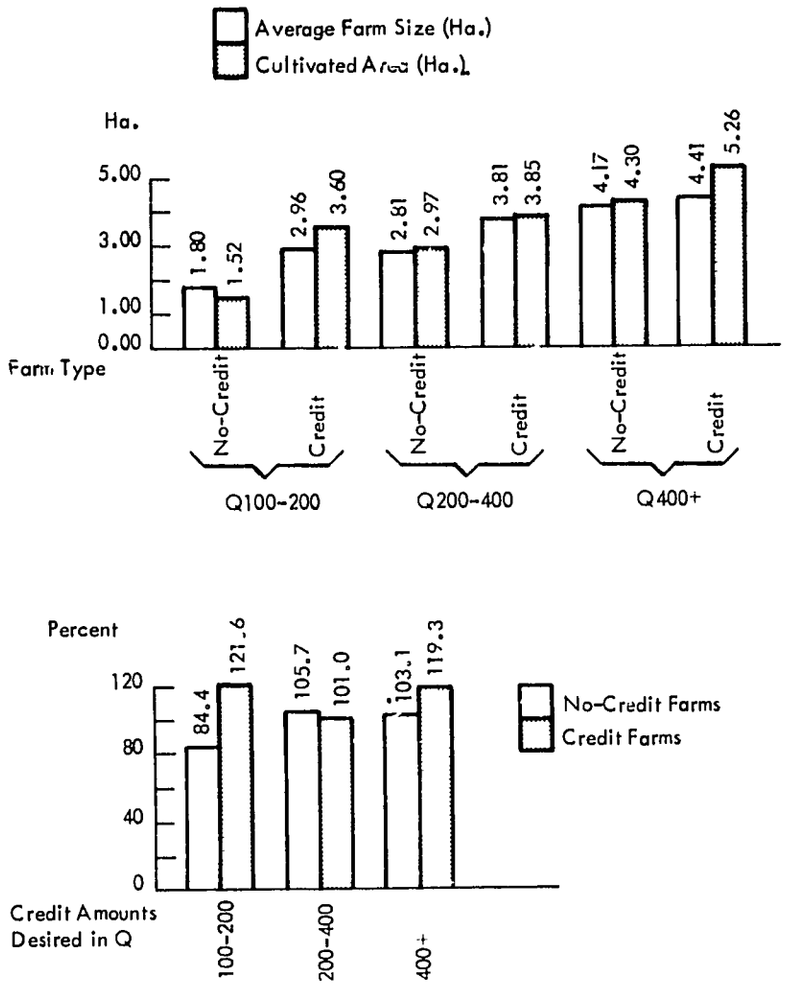
1. Changes in Land-Use Patterns

Farmers requested loans almost exclusively for expansion of crops cultivated previously on their holdings. A later section will treat the loan requests. Since this farmer intent does not focus on increasing input intensity on already existing cultivated crops, the first question which arises is the capacity of the farms in question, since the holdings are all small, to increase land-use intensity. This land intensity calculation is presented in Table 83 and Figure 33. This lends some credibility to their capacity to use land intensively, but it raises the question of how far they could expand. Essentially we are asking how much more intensive could they reasonably become. A partial answer to this might be drawn from looking at the land-use intensity performance of the credit farms, where the average land intensity index for all groups is 112.8. The lowest group was only using 84.4% of their land; the highest group was using 121.6%. This would indicate that if the land quality of the no-credit farms desiring loans is similar to the credit farms, they could reasonably be able to expand their cultivated area through increased intensity by up to 37% without employing techniques not used by

[1] L. B. Fletcher, E. Graber, W. C. Merrill and E. Thorbeck *Guatemala's Economic Development: The Role of Agriculture,* Ames, Iowa. The Iowa State University Press 1970.

[1] The problems involved in making such an extrapolation is discussed in Appendix C. These pitfalls are recognized and this estimate of gross credit demand is presented as a crude first approximation in the absence of any data on which to base a more refined calculation.

Figure 33.–Intensity of Land Use by Level of Credit Desired



similar farmers in their area. Because it was not possible to assess land quality, this study uses the landholder's estimated land value as a proxy for land quality. The reader should be cautioned that this estimate may be one of the weakest derived from the sample. With those caveats, Table 84 presents estimated land values per hectare for the credit and no-credit farms desiring loans.

The data in Table 84 indicate that the land quality of no-credit loan requestors is at least as high as credit farms. This would support the belief that the no-credit

Table 84.–Land Value and Use Intensity by Credit Amount Desired

	Credit Amounts Desired in Q		
	100-200	200-400	400+
Land use Intensity			
Index			
Credit farms	121.6	101.0	119.3
No-Credit farms	84.4	105.7	103.1
Estimated Land Value Per Hectare			
Credit farms	356	371	510
No-Credit farms	539	422	487

Table 85.–Capital Intensity by Credit Amount Desired

	Credit Amount Desired in Q		
	100-200	200-400	400+
Total value of capital Q			
Credit farms	1664	2361	3725
No-Credit farms	1245	1876	3299
Capital/Ha.			
Credit farms	555	621	847
No-Credit farms	690	670	786

Figure 34.–Capital Intensity by Credit Amount Desired

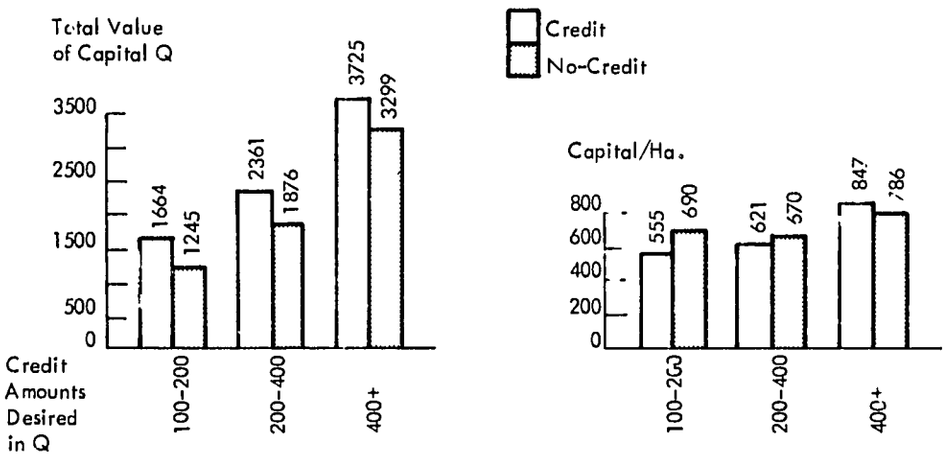
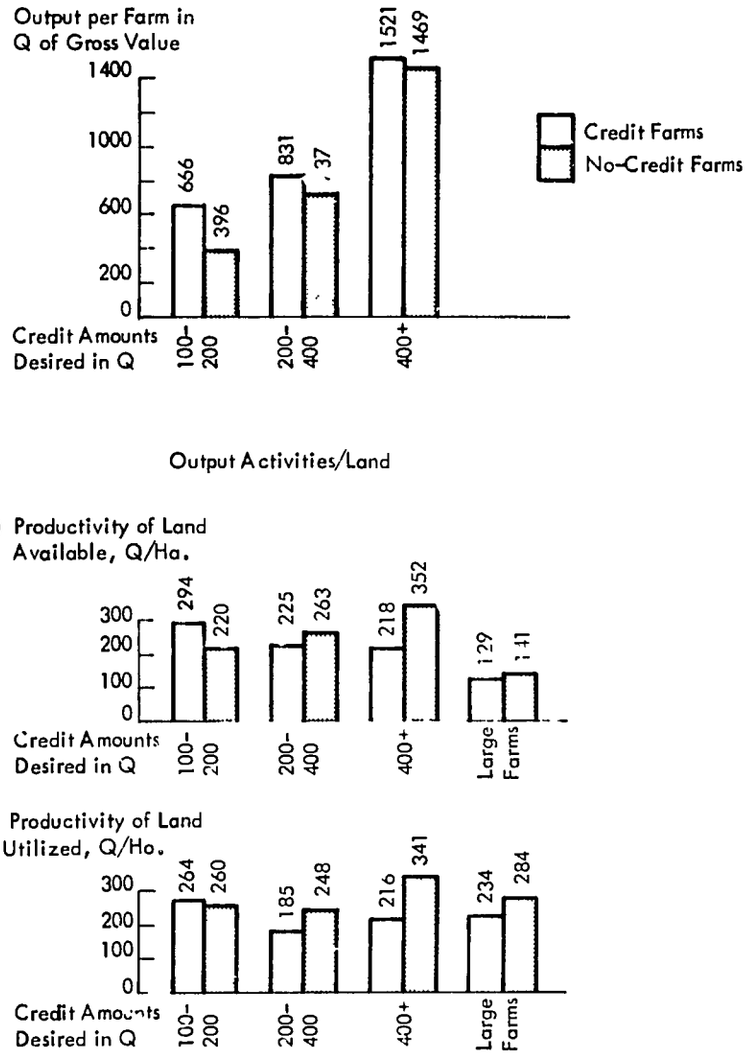


Table 86.–Small Farm Food Output Productivity of Land by Credit Desired Groupings

	Credit Amount Desired in Q			
	100-200	200-400	400+	Large Farms Comparison
Output/per farm in Q gross value				
Credit farms	666	831	1521	
No-Credit farms	396	737	1469	
Land/Output Productivities				
a) Productivity of land available (Q/Ha.)[1]				
Credit farms	294	225	218	129
No-Credit farms	220	263	352	141
b) Productivity of land utilized (Q/Ha.)[1]				
Credit farms	264	185	216	234
No-Credit farms	260	248	341	284

[1]The productivity of land available is in some instances greater than the productivity of land utilized due to the effects of double cropping and interplanting. These cause utilized land to exceed available land because of double counting when computing the former.

Figure 35.–Small Farm Food Output Productivity of Land by Credit Desired Groupings



loan requestors could, with techniques achieved by farmers in their own areas, expand their areas under cultivation significantly with the assistance of additional credit.

2. Changes in Capital-Use Patterns

A similar feasibility check on the land intensity question is the capital intensity measure, that is, have similar small farmers exhibited capacity to absorb the implied levels or total farm capital and operate successfully? In order to investigate this issue we will need to estimate total capital value on the holding, including credit. These estimates are contained in Table 85 and Figure 34.

The no-credit farms desiring credit appear to have a 400-500 Q lower capital intensity than similarly grouped credit farms desiring additional credit. On a per hectare basis, however, two of the three no-credit farm groups are already operating at a higher capital/land intensity (except for the 400+ group). This raises the question of their capacity to absorb the additional credit productively.

3. Productivity of Credit-Use by Farm Size

The tables which follow seek to quantify farm productivity performance by group in an effort to assess the credibility of their capacity to absorb the increased credit productivity.

The first notable finding in Table 86 and Figure 35 is the generally high levels of output per hectare for most of the farms. The levels of output per hectare achieved

Table 87.–Small Farm Output Productivities by Credit Desired Groupings

	Credit Amount Desired in Q			
	100-200	200-400	400+	Large Farms Comparison
Output/Capital (Q of output per Q of Capital)				
Credit farms	.40	.35	.41	.28
No-Credit farms	.32	.39	.45	.33

by farmers without credit who are requesting the largest loans is impressive, whether measured by type (a) or (b) productivity. They have been able to use both their available and cultivated land areas very efficiently. These farms are the larger of the no-credit farms with an average of 4.17 ha. and a high land-use intensity coefficient at 103. It is worth noting that none of the large farm groupings had land output productivities as high as this group. The average output per available hectare for all of the sampled farms over 10 ha. was Q134. This indicates that a "pocket" of approximately 13.2% of small farms had 162% higher output per available ha. than the large farm average. It should be remembered that 13.2% of the 400,000 small farmers is 52,800 farms, and these farms have an estimated credit demand of 28 million U.S.$.

While these aggregates may be significantly misestimated, due to the small number of farms sampled in the largest farm group, there is undoubtedly a large number of small farmers (grouped around the 4.17 ha. size) interested in loans averaging about Q540 which appear to be able to make a highly productive food output performance with the investment. On a food output basis there are certainly no significant larger farm groups that could do nearly as well per hectare. Land is not the only factor and we will have to postpone final judgement until the capital and labor calculations are reviewed.

These data tend strongly to support the credit allocation thesis of Berry in Colombia, namely, that land is a scarce resource, therefore, lend to small farmers for they will produce more per land unit than the larger farms. While the performance of this sub-group is impressive when compared with the larger farm average, it should be remembered that this is a reflection of the more generally understood tendency for the larger farm to have less efficiency in land-use because a smaller percentage of land in farm is cultivated. Therefore, while the difference is important, it is only the magnitude which is surprising.

According to the traditional "yield" criteria, larger, more commercial farms have been widely assumed to have substantially higher performance than the smaller farmer. The survey data indicate that the 13.2% pocket of small farmers had 32% higher output per hectare cultivated than the average of the large farms in the sample, and 12% higher than the best group of farms requesting relatively large loans.

The gross output per Q of capital displayed in Table 87 indicates that the "13.2% pocket" which appeared to perform so well in output per ha. also performs remarkably well on efficiency of capital use for food production. In addition, it would appear that both the credit and no-credit groups requesting loans of over Q400 have had excellent performance on capital output productivity. These farmers' need for credit, and society's

Table 88.–Small Farm Output/Labor Productivities by Credit Desired Groupings

	Amount of Credit Desired in Q			
	100-200	200-400	400+	Large Farm Comparison
Output/man day worked (family + hired) in Q				
Credit farms	3.29	3.32	4.43	4.71
No-Credit farms	3.99	3.56	3.91	6.06
Output/Family Laborer (available family labor) in Q/year				
Credit farms	579	692	1114	2387
No-Credit farms	302	525	940	2552

interest in maximum food output and national product appear to be complementary. This point should not be overly stressed because the capital productivities of the other farm groups are high as well. Note that only one of the small garm groups is lower than .35. The differences between the groups on capital use efficiency for output are not very large. The small farm loan requestors have considerable superiority over the larger farms, where none of the loan requesting groups had an output capital productivity of over .33. It would appear that a vigorous lending program aimed at this 13.2% pocket (or even more broadly among small farms) with the objective of improving the output of food supplies would be best localized among farms of less than 10 hectares.

C. THE SPECIAL ISSUE OF LABOR PRODUCTIVITY AS IT RELATES TO CREDIT DEMAND

1. Desirable Labor-Use Patterns

Table 88 displays the labor-output productivity for the farms requesting credit. As we mentioned in the discussion of productivities in general, the proper blend for Guatemala would be to maximize the amount of labor employed while keeping the quantities of capital and land used at minimal levels. That is, given the abundance of labor, it should be used as a substitute for land and capital. The objective would be to use those technologies that would permit the highest levels of employment possible without decreasing net farm income nor aggregate farm production. Such technologies would have high productivities per unit of capital and land but a low productivity per unit of labor employed.

2. Performance of the Farms Surveyed

In an effort to approach this measure we have estimated the farm level available supply of family labor and calculated the output per family-laborer-available. The "pocket" of farmers in the no-credit group requesting loans over Q400 have passed the first two criteria, i.e., high capital and land output productivities, and their performance on the employment score is likewise very acceptable. The criteria we have selected is high output per laborer available and low output per man-day utilized or worked. A review of Table 88 indicates that this group of approximately 50,000 farmers has an "available" type productivity of Q940 compared to the all-farm no-credit average of Q638 and the no-credit farms nor requesting credit of Q633. That implies that our high potential "pocket" had 47% higher output per family laborer than the average no-credit farm ahd 49% more than the 63% of no-credit farms not desiring credit. At the same time this grcup had a reasonably low output per man day utilized, indicating their capacity to absorb large quantities of labor without decreasing total production. The output per man day worked (the "utilized" type productivity measure) was Q3.91 compared to the average for all no-credit farms of 4.52, or 13% lower. The no-credit farms not desiring credit make up 63% of the universe. This constitutes about 250,000 farms. Their average was Q5.06 of output per man day utilized, or 23% higher than our high potential pocket of 50,000 farms. It should be noted that while the highest output per man day worked is in this large group of no-credit farms, they have one of the lowest output-per-family-laborer performances. From a productive employment point of view this large group of small farms would be a low priority since in addition to poor labor use they also have fairly low output productivity per available ha. This implies that they are unable to absorb large quantities of labor and at the same time keep the land and labor "availability" productivity measurements high. Only on capital productivity do they perform well.

It should be noted in Table 88 that the credit farms perform well when measured against this combination of labor-use standards. It can be shown that the credit farm overall average output per family laborer is high at Q921 and the credit farms not requesting additional loans is likewise high at Q908. More impressive still is the performance of the 40% of the credit farms who are requesting more than Q400 of additional loans, who average Q1114 output per family laborer. The two other credit farm groupings did less well in absolute terms but did perform 30-90% better than no-credit farms in similar groupings. On balance, these small loan requestors would not appear to be groups with high potential.

The further test of low output/per man day utilized also indicates the generally good performance of the credit farms. Their average ia Q3.86 as compared with a no-credit level of Q4.52, but the most attractive credit group (those requesting more than Q400) from the output per family laborer point of view is not as effective in absorbing large quantities of labor productively, since it shows Q4.43 "utilized" type productivity level. Even so, this unfavorably high level is still significantly below the 250,000 no-credit farms not desiring credit. This group (credit farms desiring loans over Q400) made a poor land productivity showing and should certainly not be ranked overall as high as the comparable no-credit "pocket" farms.

Table 89.—Summary of Comparative Performance of Small Farms in Output Productivities by Amount of Credit Desired

Credit Amount Desired in Q	Land Productivity "Available"	"Used"	Capital Productivity	Labor Productivity "Available"	"Used"	Composite*
Q100-200						
Credit farms	good	good	good	poor	good	poor
No-Credit farms	poor	good	poor	very poor	good	poor
Q200-400						
Credit farms	poor	poor	fair	fair	good	fair
No-Credit farms	fair	fair	good	poor	good	poor
Q400+						
Credit farms	poor	poor	good	best	fair	good
No-Credit farms	best	best	best	good	good	best

*The composite labor productivity rating given in the last column is an attempt to combine the two labor productivity figures into a final indicator which balances the interest in labor intensity and output efficiency.

D. A QUALITATIVE SUMMARY OF THE RELATIVE PERFORMANCE OF VARIOUS FARM GROUPS

Table 89 is a crude summary of the comparative performance of the various credit requesting groups on the output productivities. This comparison is partly subjective and is presented only to help simplify and review the results of the last few pages of rather dense discussion of the statistical tables. The best, good, fair, and poor ratings are the author's own impressions of the meaning of the figures presented in Tables 86-88.

By visually following one of the credit desired groupings across the table the reader can get a rough idea of the comparative performance of the groups. This table makes no pretense at absolute comparisons and should only be used to determine which of the groups desiring credit would be the best clients from food output and employment points of view. Our judgements regarding financial productivity (feasibility) and net income must await those tables. The lask of absolute comparisons is in the table and is important to remember. All of these productivities are generally higher than for the larger farm groups, therefore, farms appearing in the poor categories on a comparative basis with other small farms may still be reasonably high when compared with large farms or farms from other countries.

From the output and employment points of view, the farms requesting credit in large amounts would appear to have existing practices which would, if expanded with additional credit, lead to significant increases in these objectives. Farms in the small loan categories are significantly less attractive. By far the highest potential group is the approximately 50,000 small farmers without credit last year who would apparently request Q25-30 million in loans averaging Q540 each. This represents a sizeable and impressive pocket of output productivity with excellent employment impacts. The credit farms who desired loans over Q400 (about 4,000 farms) are also a high potential group, with much less attractive land use efficiency, but slightly better employment potential than the no-credit "pocket".

E. FINANCIAL PRODUCTIVITY AND THE CAPACITY TO ABSORB CREDIT

1. The Return on Loans Extended

The questions addressed below turn from our recent discussion of society's interest in food output and employment to the farmer and banker's interests in making profits and financially secure loans. These performance measures represent another indication of social benefit since farmer net income is one of our social objectives, but also adds a measurement of feasibility since both banker and farmer interest cannot be long maintained in employment and food production unless the financial productivity is attractive, or offsetting subsidies are made. Capital productivities provide direct judgements about absolute performance. The figures indicate that all of the small farmers in question are making good profit margins on their capital and could be expected to have sufficient funds to pay 10% on the added credit and have 20-30% left over for themselves. We are drawing marginal implications from average data and that is of course risky. The productivities reported in Table 90 would seem to argue against subsidizing the interest rates to any of the small-farmer credit-requesting groups. While the returns listed have been netted of a 10% return to capital and land, the return to unpaid farmer and

Table 90.–Small Farm Capital Net Income Productivity, and Value of Capital by Amounts of Credit Desired

	Amount of Credit Desired in Q			
	100-200	200-400	400+	Large Farm Comparison
Capital Productivity Q of Net Income per Q of Capital Value				
Credit farms	.28	.23	.26	.09
No-Credit farms	.26	.27	.29	.14
Average Value of Capital				
Credit farms	1664	2361	3725	
No-Credit farms	1245	1876	3299	
Average Value of Loans Obtained Last Year				
Credit farms	179	247	510	

farm family labor is included. This would reduce somewhat the evident high returns.

The fact that the credit farms have lower overall returns is partly to be explained by the larger capital base these farms have. From simply reviewing the numbers in Table 90 some tentative suggestions about the absorbability of credit might be made. The numbers in Table 90 follow an expected pattern of decreasing marginal net revenue products for capital. These marginals will be decreasing much faster than are the averages in the table. As in the table we would expect a range of low values of capital per farm at which increments to capital will have increasing marginal net revenue products and for which the average will also rise. This would be followed by a range over which the average should continue to rise but the marginal will be decreasing, and finally the average itself will decline. From this table it is impossible to determine exactly where the marginal is. If we assume the credit and no-credit groups to be similar farms and assume one of the reasons for the added capital endowment of the credit farms is the credit they have received, it appears that (except for lowest levels of capital value 1200-1600) the average productivity (net revenue product) of capital drops with additional capital provision. Careful statistical analysis on a farm by farm basis, of the data used to construct Table 90 will give us a measure of the quantity of capital absorbable before the returns drop below the interest rate charged by lenders plus a minimal incentive margin for the farmer. Whlie we await the statistical results, I will suggest some absorption levels based on interpretation of the raw averages in Table 90.

2. Credit Absorption Capacity

Since out most attractive loan requesting groups from the earlier food production and employment productivity analysis are the credit and no-credit farms requesting loans over Q400, the estimates of absorption capacity to be made here will be restricted to those two groups.

The credit absorbtion issue is phrased as follows: Among those farms desiring additional credit, and having high output and employment performance, how much credit could be absorbed before the financial productivity of that credit would fall below a reasonable interest rate for the lender plus a minimum farmer profit incentive?

Before making the estimates we need to fix the lender interest rates which are reasonable and estimate what the minimum farmer incentive level would be. An interest rate of 10% has already been subtracted out of the net income account but in order for us to test the viability of the credit process, we should estimate an interest rate which would not require any subsidy and therefore cover default, increased administration costs of accessing small farmer borrowers and managing smaller loans. I have no figures which would help me to make more than a best guess, which I will put at 16%. This means that we must have an additional 6% subtracted out of the capital productivity listed in the table to cover lender return.

The farmer incentive level in a riskless and administration-free situation should be very near zero. Evidence presented elsewhere in this document indicates that the risk aversion behavior of small farmers is apparently over-exaggerated in the literature. From the Guatemala

Table 91.—Tentative Estimates of the Capital Absortion Capacity of Small Farms with High Food Production and Employment Potential

	Average value of capital/farm	Average Q of Net Income/Q of Cap.	No. of farms in group	Q of Capital absorbable/ farm before return drops below 12%**	Q of Capital absorbable by all farms at farmer desired level	Q of Capital absorbable by all farms in group at maximum absorption level
Credit farms desiring loans Q400+	3,725	.26	4,000*	994	2,160,000	3,976,000
No-Credit farms desiring loans Q400+	3,299	.29	53,000	1,207	28,512,000	63,729,600
		Total Q of Credit Demand Among Small Farmers With High Food Output and Employment Potential			Q30,672,000	Q67,705,600

*Based on the Fletcher estimate that 10,000 small farms are probably receiving credit, assuming that all farmers with credit background will react as the credit farmers in this sample reacted.

**This calculation was made as follows: With 426 additional Q of capital the no credit farm's capital productivity dropped 3% to the 26% level of the credit farm. If we assume that rate will begin to drop faster the more capital that is added at such a rate as to double the rate of decline of the observed interval, the percent return would drop 6% for each additional Q426 of capital added. At that linear rate of decline the rate of return would reach 12% with the addition of Q994 to the credit farm and Q1,207 to the no-credit farms.

Were we able in this exercise to calculate the elasticity of production, multiply it by our average product of capital we would expect that to represent the return to increase in capital stock. To calculate the production elasticity requires attributing a portion of production increases to our input factor (capital) and then dividing the percent increase in that attributable production by the percent increase in the amounts of the input in question (capital). Though this computation is possible from the data we have, it required statistical manipulation not complete as of the drafting of this report.

Figure 36.—Tentative Estimates of the Capital Absorbtion Capacity of Small Farms with High Food Production and Employment Potential

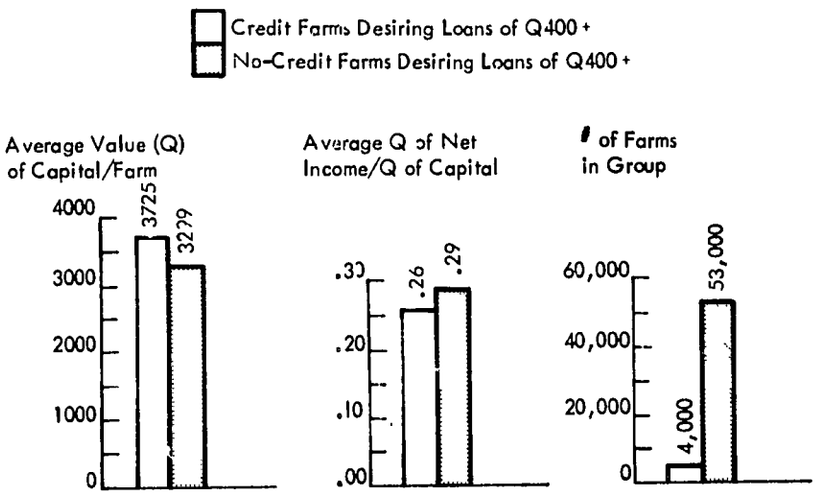


Table 92.—Additional Credit Requested for Livestock and Poultry (Weighted)

(Values in Q1000)

	Farm Size in Hectares						
	less than 10		10 and greater				
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Requested
Dairy & Beef	229	480	389	1204	618	1684	28.59
Poultry	32	120	9	3	41	122	2.07
Other animals	30	13	0	0	30	13	.21
Total[1]	291	612	398	1207	689	1819	30.89

[1]Totals may not sum due to rounding.

data it appears that they are willing to extend themselves financially on about the same risk basis as would be expected from most individual businessmen whose personal liability for debt is not insulated by the protection of a corporate charter. Even though it is felt that risk aversion behavior of small farmers is not as important as indicated by the literature, an allowance will be made for it. A 5% risk factor plus a 1% cost factor will be added to the interest rate on borrowed capital. The cost factor includes notorial fees paid by the farmer, bus fares, time required for filling out forms and participating in interviews, etc.

This all adds to a break even point of 22% return on capital, or 12% additional in terms of the figures indicated in Table 90 after the 10% imputed return to capital is subtracted.

Restricting our estimates to the two high potential loan requesting groups, we will assume that the rate of decrease in the average net revenue product of capital (our capital productivity) is inversely proportional to the increase in the amount of capital in the firm and to be conservative in the estimate we will assume the average product to drop at twice the observed rate. These estimates of credit absorbtion capacity are contained in Table 91 and Figure 36.

F. THE DISTRIBUTION OF REQUESTS FOR ADDITIONAL CREDIT BY PRODUCT

The requests for credit have been itemized by product, product group, and farm size in the tables that follow.[1] All figures in this section are weighted according to the size of the BANDESA group.

Small farmers indicated that they would like around Q1.2 million credit for livestock, poultry and other animals compared to Q1.8 million requested by the large farmers. Dairy and beef cattle represent the largest item in this group and almost 24 percent of the total quantity requested. (See Table 92 for more detail.)

The data in Table 93 indicate the distribution of loan funds requested for basic grains. Note that there were no requests for additional credit for oilseeds. It appears that corn is the second biggest user of additional credit. Requests for this category of credit represents over half of the quantity requested for this group and 25 percent of the total quantity requested.

From Table 94 it can be seen that there does not appear to be a strong demand for credit among permanent crops. Total expressed demand within this group is less than a quarter of a million quetzales. The most important temporary crop appears to be garlic at Q220,000. Note that tomatoes are a close second. These two crops represent about 70 percent of this group and 7 percent of the total additional credit requested.

Credit requests for land purchases dominate all other inputs and are concentrated among the small farm units. This category represents almost half the credit demand for this group and 2.4 percent of the total credit requested. (See Table 95 for more detail.)

Total requests for credit by farm size is presented in Table 96. Note that the small are requesting 48 percent of the total compared to using 56 percent of the credit given in 1973. The average value of additional credit requested is Q576 compared to the Q390 used in 1973. This indicates that the smaller farmers are willing to extend themselves more in order to attempt to increase their total net income.

Note that the larger farms are requesting just over half of the additional credit at an average of Q1741 per loan. Given that the average loan for the larger farms in 1973 was Q912, it appears that those farmers requesting additional credit are willing to almost double their credit burden.

[1]These data have been expanded to a total of about 5880 farmers in each group.

Table 93.–Additional Credit Requested for Basic Grains (Weighted)

(Values in Q1000)

	Farm Size in Hectares						
	less than 10		10 and greater				
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Requested
Wheat	1041	124	103	48	1144	372	6.31
Corn	3172	694	1223	805	4405	1499	25.45
Beans	1412	238	508	193	1920	432	7.33
Sorghum	538	73	237	93	775	166	2.81
Rice	381	112	272	156	653	267	4.53
Total[1]	6544	1441	2353	1295	8897	2736	46.46

[1]Totals may not sum due to rounding.

Table 94.–Credit Requested for Permanent and Temporary Crops (Weighted)

(Value in Q1000)

	Farm Size in Hectare						
	less than 10		10 and greater				
	No. Obs	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Requested
Permanent crops in diversification program							
Oranges	35	39	13	36	48	75	1.26
Bananas	35	17	36	59	71	76	1.29
Others	174	47	44	40	218	87	1.47
Total[1]	244	103	93	135	337	238	4.03
Temporary crops in diversifications program							
Onions	232	57	54	27	286	83	1.41
Potatoes	251	85	47	10	298	95	1.61
Garlic	150	93	18	127	168	220	3.73
Tomatoes	338	132	63	51	401	184	3.11
Others	101	22	4	1	105	23	.38
Total[1]	1015	389	182	216	1197	605	10.26
Other temporary crops	181	72	22	90	203	162	2.75

[1]Totals may not sum due to rounding.

Table 95.–Credit Requested for Other uses (Weighted)

(Values in Q1000)

	Farm Size in Hectares						
	less than 10		10 and greater				
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value	Percent of Total Credit Requested
Land purchase	31	141	5	2	36	144	2.44
Permanent improvements	43	18	14	91	57	109	1.84
Variable inputs	119	35	13	4	132	38	.65
Machinery & equipment	7	38	0	0	7	38	.64
Total[1]	200	231	32	97	232	329	5.57

[1]Totals may not sum due to rounding.

Table 96.–Total Credit Requested by Farm Size (Weighted)

(Values in Q1000 except average per farm)

	Farm Size in Hectares					
	less than 10		10 and greater			
	No. Obs.	Value	No. Obs.	Value	Total Obs.	Total Value
Total #of farms requesting credit[1]	4943	2849	1746	3040	6989	5889
Average Q requested per farm		576		1741		843
Percent		48.4		51.6		100.0

[1]Since some farmers requested credit for more than one item, the number of observations will not total to the number of observations by type requesting credit.

CHAPTER TEN: THE IMPACT OF TECHNICAL ASSISTANCE ON FOOD PRODUCTION AND FARMER INCOME

A. FOOD-PRODUCTION IMPACT OF TECHNICAL ASSISTANCE

In order to evaluate the impact of technical assistance on food production, we will present the putput productivity measures by amount of technical assistance received in Table 97 and Figures 37 and 38. The weakness of these measures is outlined in Chapter one.

Table 97 indicates that farms with increasing amounts of technical assistance have made improved performance on land and labor productivities. The improvements, however, are of very different types from the kind of improvements most technical assistance is aimed at. In the case of land/output productivity the technical assistance farms steadily increase in the putput per hectare in the farm, indicating a more intensive use of the available land base. Output per Ha. cultivated shows an actual decrease at a technical assistance level below ten visits. The capital productivity performance is poor, with the technical assistance farms below the no-assistance farms except at the over 10 visit level. Output per available laborer grows consistently and substantially while the output per man day utilized shows an encouraging drop except for the over 10 visit group. The question of causation is a difficult one here as elsewhere, and the fact that capital value grows faster than almost any of the improvements with increasing technical assistance may suggest either that the technical assistance follows or is directed at the better endowed and more efficient farms, and does not precede or cause that efficiency. The drop in output per ha. cultivated is the most negative of the findings and leads to some questioning of the food production returns to technical assistance where land is scarce.

Table 90 and Figure 39 explore the link between credit and technical assistance. Many have suggested that credit and technical assistance if administered together are both more efficient, the credit because the extension agent can offer the farmer the financial means to implement the technical advice, and the technical assistance because the farmer receiving it will be getting good technical direction and monitoring. There are cases in the sample of technical assistance without credit and the comparisons in Table 90 and Figure 39 are aimed at making comparative judgements about this link. At similar levels of technical assistance the no-credit farms

Table 97.–Land, Labor and Capital Output Productivity Performance of Farms with Different Amounts of Technical Assistance

	Number of Visits by Technical Assistance Personnel per Farm			
	None	1-4	5-9	10+
Land Output Productivity				
Q of Output/Ha. Cultivated	253	253	240	310
Q of Output/Ha. in farm	159	164	189	227
Capital Output Productivity				
Q of Output/Q of Capital	.34	.32	.33	.35
Labor Output Productivity				
Q of Output/Available Family Laborer	974	1112	1293	1822
Q of Output/total man days of labor utilized	4.55	4.00	4.29	5.70
Value of Capital /farm	4029	4707	5124	7409
Farm Size	8.6	9.3	9.1	11.3

Figure 37.—Land, Labor and Capital Output Productivity Performance of Farms with Different Amounts of Technical Assistance (Number of Visits by Technical Assistance Personnel per Farm)

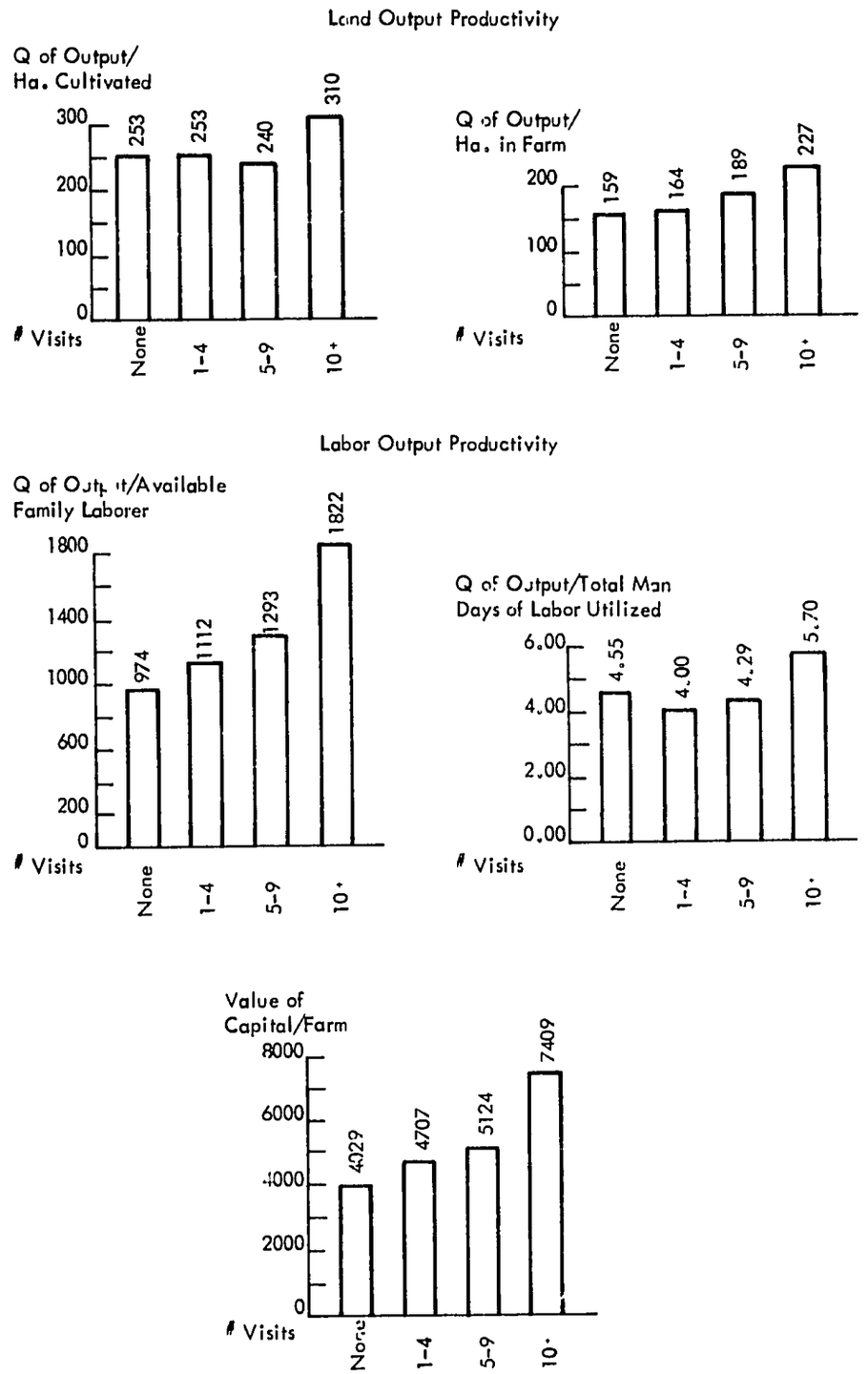


Figure 38.–Total Value of Capital per Farm by Level of Technical Assistance and Credit Type

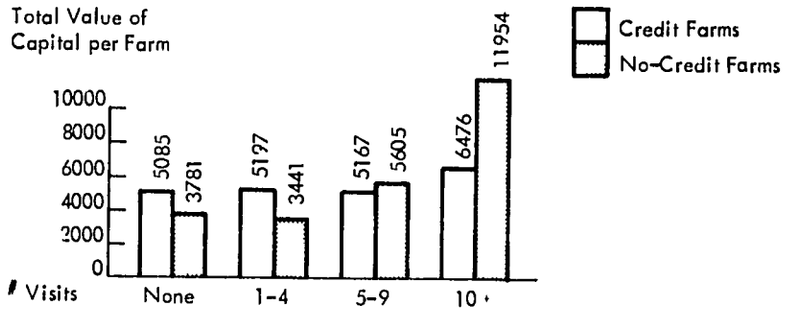
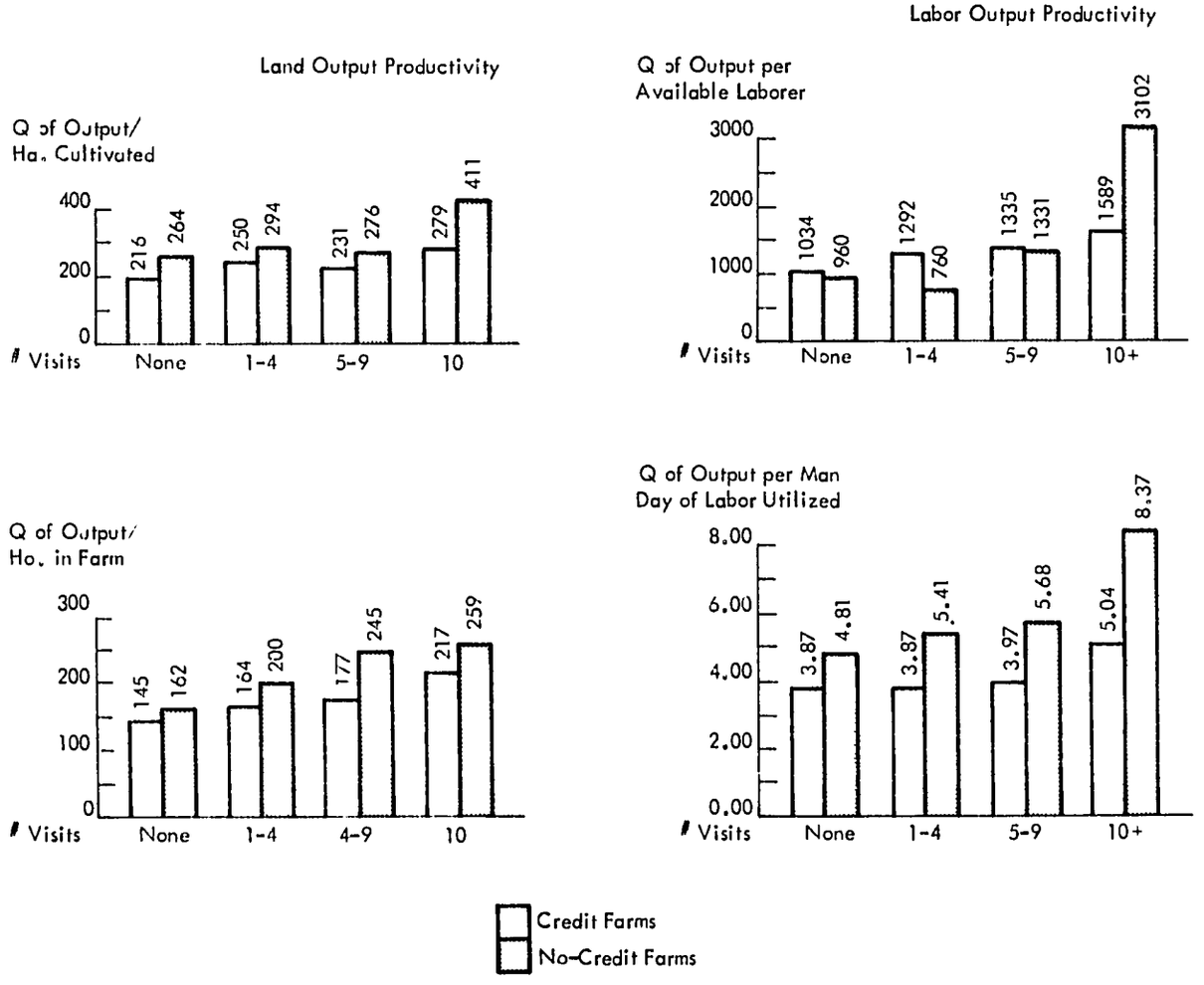


Figure 39.–Land, Labor and Capital Productivity by Amount of Technical Assistance and Credit Type



have superior performance in almost all categories. The only exception is the employment and labor output productivity category where the credit farms maintain high output per available laborer but absorb significantly more labor per unit of output. One area in which it appears that technical assistance can have significant impacts from credit is in the important output per available laborer where the increase with added assistance in impressive, but only at high levels (5 or more visits). In the 1-4 category the indicator actually decreases. The results are not consistent and while they do not make a conclusive case for any hypothesis they would lead to a serious questioning about the benefits of the credit-technical assistance link. It appears in Chapter 4 that credit in its own right has had important output impacts. Table 89 indicates that technical assistance may have had them also but the evidence is less convincing. From Table 90, we would conclude that the two linked together do not produce a more impressive food output result than they might have had if separated. It should be noted that almost all of the credit farms received technical assistance of some sort, and consequently the size of the no-assistance credit group is extremely small and probably not very believable.

B. TECHNICAL ASSISTANCE IMPACT ON FARMER INCOME

Table 99 presents the land, capital and labor net income productivity comparisons for different levels of technical assistance. From Table 99 it appears that technical assistance has had a positive but not very significant impact on the financial productivity of the credit farms, but no similar effect on the no-credit farms. The net-income-per-laborer impact on credit farms is significant. In the no-credit case the impact is inconsequential if the 10+ group performance is ignored due to the very large capital value per farm for that group. The profitability of land use appears to have been favorably impacted by technical assistance for both credit and no-credit farms.

Table 98.—Land, Labor and Capital Productivity by Amount of Technical Assistance and Credit Type

	No Technical Assistance		1-4 Visits		5-9 Visits		10 + Visits	
	Credit	No-Credit	Credit	No-Credit	Credit	No-Credit	Credit	No-Credit
Land Output Productivity								
Q of Output/Ha. Cultivated	216	264	250	294	231	276	279	411
Q of Output/Ha. in farm	145	162	164	200	177	245	217	259
Capital Output Productivity								
Q of Output/Q of Capital	.26	.37	.33	.34	.33	.34	.35	.36
Labor Output Productivity								
Q of Output per available laborer	1034	960	1292	760	1335	1331	1589	3102
Q of Output per man day of labor utilized	3.87	4.81	3.87	5.41	3.97	5.68	5.04	8.37

Table 99.—Net Income Productivities of Land, Labor and Capital by Level of Technical Assistance and Credit Type

	Number of Visits by Technical Assistance Personnel per Farm							
	None		1-4		5-9		10+	
	Credit	No-Credit	Credit	No-Credit	Credit	No-Credit	Credit	No-Credit
Land Net Income Productivity								
Q of Net Income per Ha. Cultivated	68	124	81	154	88	100	110	195
Q of Net Income per Ha. in farm	45	76	53	105	68	89	86	123
Capital Net Income Productivity (Index of Profitability)								
Q of Net Income/Q of Capital	.08	.17	.11	.18	.13	.12	.14	.17
Labor Net Income Productivity								
Q of Net Income per laborer	324	451	420	398	512	482	626	1477
Q of Net Income per man day								
day of labor utilized	1.21	2.26	1.26	2.84	1.52	2.06	1.99	3.99
Total value of capital per farm	5085	3781	5197	3441	5167	5605	6476	1195

APPENDIX A

Notes on Measurement of Net Income

1: Gross Income

Some explanation of the calculation of net income is necessary to understand the net income productivity measurements. Let us take an example of a farm requesting an additional loan of Q540 with a .26 capital net income productivity. The net income figure used as the numerator in this ratio was calculated by adding the value of home consumption produced on the farm to the value of products sold. This sum is the gross income estimate. The valuation of farm produced consumption was made by multiplying the volume of home production by the farm gate price of the same commodity if the farmer also sold some of that same product, or in the absence of sale, the average farm gate price received in the same region. These prices probably underestimate the income value to the farmer because marketing and transportation margins are not included. The reason consumer prices were not used for the valuation is that the farmer will incur some costs in excess of what he would if he were buying the produce on the market. These costs are mainly the costs of storage and losses which will inevitably occur in the goods before consumption. We expect the underestimation bias of farm gate prices to be almost overcome by storage costs and losses. Careful accounting on "costs" and income is vital if we are to get net income figures that are believable as measures of efficiency. This is perhaps even more important when small farms are involved. Excluding the value of farm commodities produced for home consumption as an income item would distort the comparability of farms at different levels of subsistence.

2: Farm Costs

On the farm-costs side of the ledger, the accounting is more difficult but just as important. A small farmer purchase of a durable good such as a back sprayer, may be a sizeable financial undertaking. If this purchase is accounted as cost in the year of purchase, the farmer's income will be improperly underestimated. Since the purchase of capital goods (such as a cow, an ox, a plow, etc.) tend to be infrequent, it is vital that depreciation schedules be applied to allocate capital goods expenditures against each year's production. This accounting required considerable extra work in the computation phase of the analysis, but we believe it is vital to obtaining believable net income figures that are comparable farm to farm. In addition, the conventional accounting norms for income and cost accrual and deferral have been applied to all relevant inputs and outputs.

3: Land and Capital Costs

A comparability problem of major proportions is caused by the land and capital costs. Since this chapter, and indeed the study in general focuses on comparing the performance of different farm types with a variety of productivity measurements, land tenure differences could not be allowed to distort the efficiency measures without economic grounds for renters and owners. This could have been the effect of charging renters with a cost of land and leaving owners with zero land expense. We have, therefore, imputed a land cost to the owners based on 10% of their estimate of the commercial value of their land. In our sample, it is observed that the average value of rent paid per hectare is very close to 10% of the average commercial value of land, as estimated by owners. This fact may lend some thin credence to the owner's estimates of land value since a sizeable overestimate on their part would have probably resulted in rental values of significantly less than 10%. Our net income figure is a good estimate for comparisons of owner and renter efficiency, but it underestimates the real material wealth or well being of the owners who have already paid for their land. The same imputation procedure was used with regard to non-land capital assets and circulating capital.

4: Sample Computation

Now back to the example of the credit farmer with a capital net income productivity of .26. An imputed return to land and capital has already been subtracted from this return. Unpaid family labor was not subtracted as a cost because virtually all of the farms included were operated by families who worked on the land and hence the problem of comparability does not arise in the same

severity as it did in the owner-renter land cost case. The .26 capital productivity indicates that this farmer earned 26¢ of net imcome per $ of capital after paying his cash costs and a 10% return to land and capital. The productivity of capital can be used as a direct measure of financial productivity and as a guide to repayment capacity. In our example, it would appear that if the farmer in question could absorb the additional Q540 he desires at his current technology, he should be able to easily repay the principal and interest and have a substantial overage to make the transaction attractive to him.

APPENDIX B

The Calculation of the Sources of Differences in Output Between Credit and No-Credit Farms

A. ALLOCATION OF THE CHANGE IN TOTAL VALUE OF OUTPUT TO FOUR PRIMARY SOURCES

1. A Description of the Indices Used

The value of output on a given farm is the sum of the value of each crop produced. This crop level value in turn is the product of three factors: the area cultivated in the crop, the yield per hectare and the price received when selling the crop. Thus, if we consider the typical credit farm:

a_{ic} = the area (hectares cultivated) in crop i on farm c

y_{ic} = the yield (kgs/ha) of crop i on farm c

p_{ic} = the price (Quetzales/kg) of crop i on farm c

then

$$v_{ic} = a_{ic}y_{ic}p_{ic}$$

where v_{ic} is the value of the i^{th} crop on the c^{th} farm. If we then add up the v_{ic}'s for all the crops grown on that farm, we will have the total value of production on the farm. Using summation notation, we can say:

$$\text{Total value of production on farm c} = \sum_{i=1}^{q} a_{ic}y_{ic}p_{ic}$$

where q is the number of crops grown on farm c. If we let farm c be a credit-receiving farm, then we may define a corresponding no-credit farm as farm n. The total value of output for the no-credit farm would be

$$\sum_{i=1}^{q} a_{in}y_{in}p_{in}$$

The ratio of the value of output of the credit and no-credit farm is then

$$\frac{\Sigma\, a_{ic}y_{ic}p_{ic}}{\Sigma\, a_{in}y_{in}p_{in}}$$

If this ratio is greater than one it indicates that the credit farm did better than the other farm. If it is less than one, the reverse is true.

The four sources of change between the credit and no-credit farm may be isolated by means of an algebraic identity. This identity is expressed as follows:

$$\frac{\Sigma\, a_c y_c p_c}{\Sigma\, a_n y_n p_n} = \left[\frac{\Sigma\, a_c y_n p_n}{\Sigma\, a_n y_n p_n} \cdot \left(\frac{\Sigma\, a_n}{\Sigma\, a_c}\right)\right] \cdot \left[\frac{\Sigma\, a_c y_c p_c}{\Sigma\, a_c y_c p_n}\right] \cdot \left[\frac{\Sigma\, a_c y_c p_n}{\Sigma\, a_c y_n p_n}\right] \cdot \left[\frac{\Sigma\, a_c}{\Sigma\, a_n}\right]$$

Total Value | Crop Mix | Price | Yield | Area

The subscripts referring to the crops have been dropped for the sake of clarity in the presentation, but it should be remembered that the summation is over crops. By inspection it may be observed that various of the numerators and denominators on the right hand side "cancel out", leaving nothing more than the terms on the left hand side. Underneath each of the terms in brackets on the right hand side is a label of the component of change which it measures. These are index numbers which will differ from one only if there is variation between farms

at the crop level in the indicated source. Essentially these are a set of weighted indices whose product is equal to the change in total value.

The index numbers measuring price and yield variation are largely self-explanatory, however a few words should be said about the measure of crop mix variation. Basically it answers the question: What would have the credit farm revenue been if this farm had been subject to the prices and yields of the no-credit farm, restricted to a land area equal to that of the no-credit farm yet been allowed to use this land in its "credit proportions"? The revenue so earned is divided by the revenue of the no-credit farms. The quotient is a measure of the change in total revenue due to changes in crop composition.

The area planted in a given crop may change for one or both of two reasons. First, the credit farm may in fact have fewer hectares in low-valued crops and more in high-valued crops while maintaining a total area equal to the no-credit farm. Secondly, the credit farm may just have a greater total area under cultivation. This second possibility does not reflect shifts in crop mix but merely differences in area under cultivation. Therefore, the "area effect" must be separated from the changes in crop composition. This is accomplished by deflating the first term in the mix brackets by the ratio of total area planted on no-credit farms to total area planted on credit farms. This area effect is then considered separately as noted in the last term of the identity.

2. Some Comments on the Indices

a. *Alternative Weighting Schemes*

Looking at the equation presented in the last section, it can be seen that the measure of change in crop mix is a deflated area index weighted by the no-credit price and yield values. The price index uses credit-farm area and yield weights while the yield index uses a combination of area weights from the credit farms and price weights from the no-credit farms. These combinations of weights are essentially arbitrarily assigned. The mix index could have had credit farm price and yield weights and the other indices would have been adjusted correspondingly. The area index is unaffected by this problem as its computation does not involve a weighting system.

In order to find out how sensitive the mix, yield and price index numbers are to the weights used they were recomputed under two extreme assumptions. First they were all evaluated using no-credit farm weights exclusively. Secondly, they were computed using credit farm weights exclusively. The resulting index values are not multiplicatively related to the index of total value. However, they do illustrate how the weighting scheme used can affect the magnitude of the resulting index numbers.

Table 100 contains these numbers. Under "Method 1" are displayed the values obtained by using the elements of the equation presented in the last section. "Method 2" contains the values when the numbers are uniformly computed with no-credit farm weights. These might be considered Laspeyres indices if one considers the no-credit farms as representing the "base" situation. Under "Method 3" are presented the index number values when they are all computed using credit farm weights.

There are several cases where the different weighting schemes result in values which indicate a contradictory effect. Using Methods 1 and 3 for example, may suggest that yield was positively associated with total value while Method 2 indicates a negative association. The 1-3 hectare group in the Central Highlands involves such a situation. These cases of contradictory association are indicated by asterisks placed after the value in question.

In general there is no "right answer" to the problem of which set of weights to use. The reader must decide for himself which set of weights are most appropriate and then be guided in policy formulation by the resulting magnitudes. Alternatively he may decide to trust only those findings in which the values are close and certainly of the same sign, when converted to percentage changes.

b. *Conversion from Multiplicative Index Values to Additive Percentages*

This point deals with the difference between the multiplicative nature of the indices developed in this appendix as compared to the additive percentage values presented in Tables 21, 22, and 23. The problem concerns the basic issue of interaction between the sources of overall change. This interaction issue is perhaps best dealt with by an example. Suppose yield were 10 percent higher on credit farms while all other potential sources of difference were identical. Then one would expect gross value of output to be 10 percent higher on the credit farms. Now suppose that yield showed a 10 percent difference while area showed a 5 percent superiority on the credit farms. One might conclude that overall output would be greater on credit farms by the sum of these two percentages, namely 15 percent. However, this would ignore the fact that yield increases were registered not only on the original land but on the 5 percent additional area. In other words, there is an interaction effect between the change in yield and the change

Table 100.—A Comparison of the "Sources" Index Number When Computed with Different Weights

	Total Value	Crop Mix			Yield			Price			Area
		Method 1 (Non-Credit Weights)	Method 2 (Non-Credit Weights)	Method 3 (Credit Weights)	Method 1 (Hybrid Weights)	Method 2 (Non-Credit Weights)	Method 3 (Credit Weights)	Method 1 (Credit Weights)	Method 2 (Non-Credit Weights)	Method 3 (Credit Weights)	
National											
All Farm Sizes	1.32	1.00	1.00	1.02	0.97	0.96	0.95	1.00	1.00	1.00	1.36
National Average											
0-1 Ha.	2.47	2.65	2.65	2.63	0.96	0.95	0.97	0.99	0.98	0.99	0.98
1-3 Ha.	1.37	1.14	1.14	1.13	1.01	1.05	0.80*	1.02	1.22	1.02	1.17
3-5 Ha.	1.20	0.91	0.91	0.96	1.17	1.14	1.18	0.97	0.93	0.97	1.17
5-10 Ha.	1.12	0.98	0.98	0.87	1.03	0.99	1.00	0.93	1.09*	0.93	1.20
10+ Ha.	1.17	0.99	0.99	1.03	1.00	0.90	0.94	0.92	1.01*	0.92	1.28
Regional											
All Farm Sizes											
Central Highlands	1.32	1.11	1.11	1.06	0.90	0.96	0.88	1.03	1.03	1.03	1.29
South Coast (West)	1.95	0.94	0.94	0.86	1.28	1.37	1.25	1.01	1.04	1.01	1.60
South Coast (East)	1.13	1.01	1.01	1.09	0.84	0.78	0.85	1.04	1.01	1.04	1.29
Northeast	1.58	1.08	1.08	1.06	1.01	1.07	0.89*	1.03	1.11	1.03	1.41
Southeast Highlands	1.15	0.09	0.90	1.04	0.95	0.89	0.97	1.03	0.93*	1.03	1.31
Central Highlands											
0-1 Ha.	2.12	2.04	2.04	2.04	0.98	0.93	0.99	1.03	1.07	1.03	1.03
1-3 Ha.	1.54	1.27	1.27	1.15	0.97	1.07*	0.94	1.04	1.06	1.04	1.20
3-5 Ha.	1.99	1.27	1.27	1.16	1.13	1.27	1.13	1.00	0.97	1.00	1.39
5-10 Ha.	0.97	0.94	0.94	0.83	0.78	0.87	0.71	0.99	1.14*	0.99	1.34
10+ Ha.	0.77	0.93	0.93	0.87	0.86	0.93	0.85	1.02	1.02	1.02	0.95
South Coast (West)											
0-1 Ha.	—	—	—	—	—	—	—	—	—	—	—
1-3 Ha.	1.42	0.81	0.81	0.96	1.39	1.20	1.40	1.05	1.02	1.05	1.20
3-5 Ha.	1.92	1.00	1.00	0.79	1.41	1.75	1.42	1.05	1.08	1.05	1.30
5-10 Ha.	0.73	1.01	1.01	0.92	0.80	0.86	0.80	0.92	0.94	0.92	0.98
10+ Ha.	2.09	0.99	0.99	0.94	1.33	1.37	1.32	1.05	1.07	1.05	1.52
South Coast (East)											
0-1 Ha.	—	—	—	—	—	—	—	—	—	—	—
1-3 Ha.	0.88	0.90	0.90	0.88	1.03	1.00	1.03	0.86	0.90	0.86	1.11
3-5 Ha.	1.52	1.00	1.00	0.94	1.06	1.12	1.05	0.98	1.00	0.98	1.46
5-10 Ha.	0.81	0.85	0.85	0.85	0.83	0.84	0.84	1.01	1.00	1.01	1.15
10+ Ha.	1.18	1.14	1.14	1.18	0.79	0.77	0.81	1.06	0.99*	1.06	1.24
Northeast											
0-1 Ha.	3.55	4.73	4.73	7.18	0.95	0.76	0.97	0.98	0.73	0.98	0.81
1-3 Ha.	1.61	1.40	1.40	1.42	1.18	1.25	0.64	1.04	1.63	1.04	0.94
3-5 Ha.	0.97	0.66	0.66	0.82	1.28	1.16	1.31	1.06	0.93*	1.06	1.08
5-10 Ha.	1.88	1.58	1.58	1.51	1.28	1.26	1.22	0.80	0.90*	0.80	1.17
10+ Ha.	1.41	1.12	1.12	1.01	0.97	1.00	0.43*	1.00	1.35*	1.00	1.29
Southeast Highlands											
0-1 Ha.	1.94	1.63	1.63	1.74	1.17	1.17	1.15	1.15	1.08	1.15	0.88
1-3 Ha.	1.39	0.90	0.90	0.91	1.03	0.99*	1.01	0.96	1.03*	0.96	1.56
3-5 Ha.	1.17	0.93	0.93	1.01	1.18	1.10	1.20	0.94	0.91	0.94	1.13
5-10 Ha.	1.22	0.96	0.96	0.59	1.07	1.05	0.98*	0.91	1.31*	0.91	1.31
10+ Ha.	1.05	1.13	1.13	1.05	1.14*	0.91	0.92	0.61	0.83	0.61	1.35

*Indicates cases where alternative weighting schemes result in contradictory association of the source in question. (See text.)

in area. Thus the true increase in total value is greater than 15 percent. Specifically it is 15 percent plus 5 percent of 10 percent or 0.5 percent. So the total increase in output is 15.5 percent in this example.

The interactive nature of the sources of change in total output is captured in the equation presented above. For the four sources of change specified this interaction is quite involved. Each source is related to each other source on a bilateral basis as discussed in the example, then each is related to two of the others and finally they all are interrelated. The numerical implication of this interaction effect is that the sum of the percentage changes of each of the sources is less than the percentage change in total output.

In Tables 21, 22, and 23 the results reported are additive in that the sum of percentage changes of each of the sources equals the percentage change in the total value. This conversion from a multiplicative to an additive relationship among sources was done for ease of understanding. The way the conversion was performed was by computing the difference between the percentage change in total output and the sum of the percentage changes in each of the sources. This difference was then allocated proportionately among the sources according to their relative importance. In this way the interaction effect which was picked up as this difference was allocated back into each of the sources. Thus an essentially artificial additive relationship was established among factors which are multiplicatively related. The extent to which this reconciliation process alters the original index values may be seen by comparing the results presented under "Method 1" in Table 100 with the corresponding percentage changes shown in Tables 21, 22 and 23.

c. *The Grouping of Farm-Level Data by Farm Size-Class and Region*

Here we are interested in the way in which farm size groups rather than individual farms are treated. As noted elsewhere in this document, the survey on which the analysis is based consists of approximately 800 credit farms and 800 no-credit farms. These farms are of various sizes and located in various regions of the country. In the present "sources" analysis these farms have been grouped into five classes in each of five regions. Within each of these twenty-five groups there are credit and no-credit farms. Thus a farm in the sample was classified in the one of fifty groups to which it pertained. These groups and the number of sampled farms in each are presented in Table 13. The results reported in Chapter 5 are based on weighted averages for the farms in each of the groups. The price and yield figures for each of these groups is calculated as the weighted average for that crop among all the farms in the group. The area figure is the weighted average area per farm planted in each of the crops considered. The system of weights used is discussed in Appendix C. Multiple cropped land is counted the corresponding multiple number of times while interplanted land is counted twice. This unusual method of measuring area permits us to examine in considerable detail the sense in which the land is used. This point is developed further in the next section.

d. *Derivation of Price and Yield Figures When None Exist*

Another technical point deals with the problem differences in crop mix so great that some crops grown on credit farms are just not grown at all on no-credit farms. In this case, the no-credit price and yield data are not available. An estimate must be made of what they would have been if they had been grown. This estimate is necessary so as not to bias the index numbers unduly. Two approaches were followed in the course of the analysis. The first was to search among no-credit farms in other size classes to find the needed price and yield data. The second was to use the credit farm data when no-credit information was unavailable. The results were compared and found to be essentially the same in all but a few isolated instances. These discrepancies do not affect the basic conclusions drawn in the text. Thus only one set of results, those based on the second approach, are reported. In general the approach used will conservatively bias the findings. In other words the results derived will be closer to unity than they would have been if another method had been used to derive the missing price and yield data. This is so because the numerator and denominator of the index number in question have a greater number of identical elements.

B. ALLOCATION OF THE DIFFERENCES IN AREA TO FOUR COMPONENTS

1. A Description of the Method Used

As is apparent in Tables 21, 22, and 23 "area" is in most cases the most important explanatory factor in accounting for the difference in total value per farm, on credit versus no-credit farms. This leads one to ask what do we mean by "area", and is it possible in turn to break this element down into its components? Area per farm is

defined as the sum of all land planted in temporary and permanent crops where multiple cropped land is counted a multiple number of times and interplanted land is counted twice. Thus given this definition it is possible for a farmer's total "area" to be greater than the extent of his farm due to the multiple counting of some areas.

There are several reasons this measure of cultivated area may be larger on credit farms than on no-credit farms or vice-versa. One of the two farms may be larger in size. In other words one farm may have more land (as conventionally measured - no double counting) than the other. A second possibility is that the two farms are of equal size but on one farm a larger fraction of the farm is dedicated to crops. One group of farmers may, as a third possibility, do more double and triple cropping than the other.[1] Finally the farmers of one group may dedicate more of their land to interplanted crops, corn-and-beans, corn-and-sorghum, etc. Thus four possible explanations of the difference in "area" as defined above have been identified. They are:

1. Size of Farm
2. Cultivated Area
3. Multiple Cropping
4. Interplanting

Other components such as planting density could also be considered, however these should be reflected in the yield measure discussed in the previous section. In fact multiple cropping and interplanting may also be related to yields although not necessarily proportionately. (In some cases interplanting may be associated with higher yields.) There is then some overlap in coverage of the various sources and components considered in this appendix, however they are in the main independent.

The index of farm size is defined as:

$$\frac{A_c}{A_n}$$

where

A_i = Total area (but no double counting) of farm i

i = c (i.e. credit)

i = n (i.e. no-credit)

[1] In the questionnaire used for the survey there is provision only for recording double cropping. Therefore instances of triple cropping are not captured.

The index of cultivated area adjusted for differences in farm size is defined as:

$$\frac{T_c / A_c}{T_n / A_n}$$

where

T_i = Area dedicated (but no double counting) to permanent and temporary crops on farm i.

The index measuring differences in rates of multiple cropping is defined as:

$$\frac{M_c / T_c}{M_n / T_n}$$

where

M_i = Total cropped area on farm i counting multiply cropped land the corresponding multiple number of times but counting interplanted land only *once*.

Finally the index measuring differences in the rates of interplanting is defined as:

$$\frac{I_c / M_c}{I_n / M_n}$$

where

I_i = Total cropped area on farm i counting interplanted land *twice* as well as counting multiply cropped land a multiple number of times. Therefore,

$$I_i = \Sigma a_i$$

where a_i is defined in the preceding section.

Notice that these four indices are multiplicatively related to the "area" index which they "explain". This area index is in fact (I_c/I_n) and the identity expressing this relationship is:

$$\left[\frac{I_c}{I_n}\right] = \left[\frac{A_c}{A_n}\right] \cdot \left[\frac{(T_c / A_c)}{(T_n / A_n)}\right] \cdot \left[\frac{(M_c / T_c)}{(M_n / T_n)}\right] \cdot \left[\frac{(I_c / M_c)}{(I_n / M_n)}\right]$$

Gross "Area"	Size of Farm	Cultivated Area	Multiple Cropping	Inter-planting

2. A Few Thoughts About the Components of the Area Index

The identity just defined is similar in some respects to the identity relationship between index numbers specified in the last section. It is used to further examine one of the terms in that expression, namely

$$\frac{\Sigma a_c}{\Sigma a_n}$$

In fact it is possible to concatenate the two identities and get a seven term expression which quantifies the components of the ratio of total value of output on credit to that on no-credit farms. In summary these seven components are:

Crop Mix
Price
Yield
Size of Farm
Cultivated Area
Multiple Cropping
Interplanting

As just explained the last four involve no weighted summation as do the first three. Thus the problem of choosing appropriate weights is not present in the case of the area components. Also there is no problem of deriving estimated values for those weights when there are none available.

On the other hand, the problem of converting from multiplicative index values to additive percentages changes still besets the analysis. The technique used in this latter case is the same as was used previously. The index values are converted to raw percentage changes. These are summed. This total is subtracted from the refined total percentage change in area as derived in the preceding section. The difference is allocated proportionately among the raw component values. Specifically each raw component is multiplied by the ratio of the refined area total to the sum of the raw components. The resulting refined component percentage changes by definition sum to the refined total area percentage change.

It should be noted that this technique will tend to exaggerate the refined component percentage change values if the ratio of the refined to raw total area is large. For example, if the adjusted (refined) area is two percent higher on credit farms and the sum of the raw components is one percent, then each raw component value will be doubled when converting it to an adjusted value. Currently, an alternative adjustment technique is under study which involves proportional distribution of the absolute value of the residual. This is discussed in greater detail in a forthcoming Methodological Working Document of the Sector Analysis Division.

APPENDIX C

Discussion of the Sample Design

A. INTRODUCTION

The overall purpose of the Small Farmer Credit Survey was to examine the impact of credit on the performance of farmers in the BANDESA credit program. The most convenient and direct way of doing this is to compare the BANDESA farmers with similar farmers who do not have access to BANDESA credit. To make such a comparison, a control group of "NON-BANDESA" farmers was identified by matching one half of all the farms in the BANDESA program to similar NON-BANDESA farms. A sub-sample of the matched pairs as then included in the Small Farmer Credit Survey.

In this appendix, we will describe the Small Farmer Credit Survey in detail and then will show that our attempt at establishing a control group was successful. We feel that as a result it was possible to observe credit related differences between the two groups of farmers. A study of these differences should be valuable in formulating future credit programs in Guatemala.

B. DESCRIPTION OF THE SAMPLING PROCEDURES

1. Objectives of the Study - The Small Farmer Credit Survey was designed to carry out the following objectives:

1. To provide a large number of statistical tables that permit an analysis of the farms in the loan program and similar tables for a large control group of farms that are not in the program. The present study represents one of the first presentations of these tabular results. Also available are General Working Document #50, "Descriptive Tables from the Guatemala Small Farmer Credit Survey", and Statistical Working Document #18, "A Closer Look at Some Statistics from the 1974 Guatemala Small Farm Survey".

2. To provide data for a limited analysis of the small farm loan program on the cultivation of the principal crop in each sub-region. This feature of the sample design was requested by members of DIGESA of the Guatemala Government and resulted in the sample being selected by sub-region.

3. To collect data that can be used in a linear programming model to analyze the effects of the small farm loan program at the regional and national levels. Work is currently in progress on this linear programming model.

2. The Survey - A large subsample (about 3,000) of the loan-holders was selected and each one was paired with a non-loan-holder with similar characteristics. A sample of about 800 pairs of farms was selected and interviewed. The pairs of farms were selected by sub-region at different sampling rates so that a minimum of 40-50 interviews were conducted at farms growing a crop identified as the principal crop in that sub-region. Estimates were made at the sub-regional, regional and national levels, although the number and type of estimates that could be made at the sub-regional and regional levels would be somewhat limited due to sample size.

3. Speculations About Sample Size Required for Sub-regional Estimates - Since the universe is made up of small farms, it was reasonable to assume a population relative variance (V^2) of 1 in the formula for determining sample size, for a majority of the characteristics that are being measured. This value should be close to the true relative variance. Using the simplest formula for relative variance of the estimate, we have:

$$V^2_{\bar{x}} = \frac{V^2 \frac{(N-n)}{(N)}}{n}$$ Where:

V^2 is the relative variance of the population

N is the universe total

n is the sample size

Therefore, $\frac{N-n}{N}$ is the proportion of the universe that is not in the sample

$V_{\bar{x}}$ is the coefficient of variation (c.v.) of the estimate, i.e.

$$V_{\bar{x}} = \frac{\sigma_{\bar{x}}}{\bar{x}}$$ Where:

$\bar{x}$ is the sample mean and

$\sigma_{\bar{x}}$ is the sample standard deviation of the mean

The term N-n/N has an average value of .87 since 800 of about 6400 farms will be in sample. Substituting this value and $V^2 = 1$ into the formula that relates sample size and relative variance we can solve for $V_{\bar{x}}$

$$\text{when } n = 50: \quad v^2_{\bar{x}} = \frac{.87(1)}{50} = 0.017$$

$$V_{\bar{x}} = .13 \quad \text{(i.e., a c.v. of about 13\%)}$$

The effects of ordering the farms by area of principal crops before selecting the sample should reduce the sampling error of estimates of totals slightly. Moreover, many of the more important characteristics are ratios, such as yields, and differences between matched farms. These estimates of ratios and differences may have a lower sampling error than estimates of an absolute total. As a result, those estimates associated with a large proportion of the farms should have a c.v. between 10 and 12 percent. This reasoning, together with the constraints of time and resources that did not permit the use of a larger sample size, led to the choice of about 50 for the sample size within each sub-region.

Estimates for regions should be slightly better than those for a sub-region. Except for the most highly variable characteristics, most of the estimates associated with a large proportion of the farms at the regional level should have a c.v. of 10 percent or less. At the national level a coefficient of variation of 5 percent or less can be expected for many items.

Estimates of highly variable characteristics and rare events (those belonging to a small subset of farms) will have greater sampling error than that suggested above. For this reason, estimates may be unavailable or unreliable for sub-classes of farms where the loan program has few participants. Table 101 shows the weighted (estimated) number of farms by region and farm size. Where the estimated number of farms is less than 150 the results may be unreliable and should be used with caution.

4. Forming the Control Group - Under ideal conditions, a simple experiment to measure the effects of loans on the small farmer's income, productivity, etc., would consist of two randomized groups from the same

Table 101.–Weighted Number of Farms by Region and Farm Size

	Farm Size (Hectares)					
	0-1	1-3	3-5	5-10	10+	All Sizes
Central Highlands						
Credit	175	789	342	213	201	1720
No-Credit	465	552	271	283	149	1720
South Coast (West)						
Credit	0	42	114	31	343	530
No-Credit	52	62	31	114	270	529
South Coast (East)						
Credit	0	142	182	391	305	1020
No-Credit	47	292	142	168	371	1020
North East Highlands						
Credit	30	317	177	210	291	1025
No-Credit	77	402	194	159	191	1023
South East Highlands						
Credit	13	389	424	413	350	1589
No-Credit	49	483	450	209	398	1589
National Average						
Credit	218	1679	1239	1258	1490	5884
No-Credit	690	1791	1088	933	1379	5881

universe, one with loans and the other without loans. Comparisons between the two groups could then be made to measure the effects of the loans. The objective of forming the control group for the present survey was to try to approximate the conditions desired for such an experimental design. The form of the analysis depends on how successful we were at establishing a control group from the same universe as the loan-holders.

The procedures proposed for forming the control group are given below:

1. Organize the list of about 6000 small farmers with loans by sub-region and within sub-region by promoter area.
2. Order the list within promoter's area by farm area planted in the sub-region's principal crop and list the names of other crops grown on each farm in order of their crop areas.
3. Beginning with step 2, systematically select every 2nd loan-holder.
4. Number the selected loan-holders. Copy these numbers, the total area of the farm, the age of the loan-holder, and the names of his principal onto a separate "Form No. 1" (see Figure 40) for each promoter's area. Ask the promoters to provide a match for each selected loan-holder whose number and characteristics appear on "Form No. 1." The name of the loan-holder should not be given to the promoter at this point. Each promoter should have about 15 matches to make.
5. The matching farmers should be potential participants in the program and should meet all the criteria of loan-holders. However, they are not necessarily representative of all potential participants. Ideally, they should come from the same universe as the loan-holders with the only difference being that one group has loans from the small farmer loan program and the other does not. The match farmers may have loans from other sources.

5. Selecting the Sample - The sample was selected by sub-region to make certain that a minimum number of sample farms that produce the designated principal crop for each sub-region was in the sample. This minimum was set as 50, but as few as 40 sample farms that grow the principal crop (and sometimes even fewer than 40) were acceptable.

There were two other constraints which had to be observed in selecting the sample. The first was that because of a shortage of resources and time the total sample size could not exceed 800 pairs of farms. The second constraint was that every farm in the loan program had to be represented by the sample.

The following procedures were used to select the sample:

1. Fill out the Sample Selection Worksheet (Figure 41) through Box No. 4 in the heading and columns (a) and (b) below the heading.
2. Separate the worksheets into groups according to the value of k (in Box No. 4 of the heading).
3. Using the first value of k, select a random number between 1 and k. Put this number in Box No. 5 in the heading of the first worksheet.
4. Follow the instructions at the bottom of the worksheet to select the sample for the first sub-region.
5. The random start for the second sub-region will be based on the number of farms remaining on the list after the last sample farm is identified on the worksheet for the first sub-region.
6. Subtract the count in step 5 from k. This is the random start for the second sub-region. Put this number in Box No. 5 of the second worksheet.
7. Repeat steps 4-6 for each sub-region with this value of k.
8. For each additional value of k, repeat steps 3-7.
9. Copy the names of sample farmers onto the Interviewer Assignment Form under the column for Group A. Find the match farmer on Form No. 1 and copy his name beside that of the sample farmer under the column for Group B.

NOTE: The values of k should be rounded to the nearest whole number.

Take a look at the k-values. Try to consolidate the k-values into as few groups as possible. If, for example, you have five sub-regions with k=6 and two with k=7 and four with k=8, it may be possible to make one of the 7's a 6 and the other one an 8. This can be done when the value in Box No. 3 is 75 or greater and k is 5 or greater.

6. Check-In, Coding and Punching - As the questionnaires were completed they began to flow into DIGESA. One person was needed to check-in the questionnaires, that is, to check the names and number of the completed questionnaire against those that were expected from each interviewer (Figure 42). If more than 5 percent of the expected number of questionnaires was missing from all intrviews, additional field work was necessary.

Figure 40
Form No. 1.

sub-region_____

Promotor region_____

List of Matching Non-Participants in Loan Program

Farm No.	Total area of the farm	Age of Producer	Crops grown on farm in order of importance	NON-BANDESA Producer's Name & Location

Figure 41
Form No. 2.

SAMPLE SELECTION WORKSHEET

Sub-Region _____

Farm Name (a)	Area of Principal Crop (b)	Sample Farms (c)	Sample Weight (d)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
.			
.			
.			
.			
N.			

Instructions:

Total No. of Farms (1)	No. of farms with Principal Crop (2)	$\frac{\text{Box (2)}}{\text{Box (1)}}$ (3)	$\frac{\text{k=box (1)}^*}{50}$ (4)	Random Start (5)

Starting with the farm in Column (a) whose number appears in box 5, take every kth farm, writing their numbers in Column (c). If Box No. 3 has a value of .6 or less, return to the beginning of column (c) and fill in the blanks of the first 10 farms with their farm No. If Box No. 3 in the heading is .6 or less, put 1 in Column (d) for the first 10 farms and k in Column (d) for all other sample farms. If Box No. 3 of the heading is greater than .6, put k in Column (d) for all sample farms including those selected from the first 10.

*Round to whole number.

Figure 42
Form No. 3.

INTERVIEWER ASSIGNMENT FORM

Instructions: Locate the farm listed below and conduct an interview as explained in the training course. The respondent in each case should be the farmer himself. It may be necessary to return to some of the farms a second time in order to interview the farmer. Completed questionnaires should be returned to DIGESA

	Farmers - Group A	Farmers - Group B
1.	Name: _____	_____
	Location _____	_____
2.	Name: _____	_____
	Location _____	_____
3.	Name: _____	_____
	Location _____	_____
4.	Name: _____	_____
	Location _____	_____
5.	Name: _____	_____
	Location _____	_____
6.	Name: _____	_____
	Location _____	_____
7.	Name: _____	_____
	Location _____	_____
8.	Name: _____	_____
	Location _____	_____

Codes were to be developed for each question on the questionnaire, where the words "Para uso de la Oficina" appeared beside the answer box. As the questionnaires were checked in they were assigned to coding clerks for coding. Each box was checked carefully, since the omission of a code would be a serious data processing error. Coding took five clerks about two weeks to complete.

Once the questionnaires were coded, they could be sent forward for punching. The questionnaire was designed so that the punch operator simply punched the identification information and then, for each data cell that has an entry, punched first the code in the upper left corner of the data cell and then the data. When the data cells had no entry, the punch operator skipped over them until one was found with an entry in it.

The punching was done at the Bureau of Census facility in Jeffersonville, Indiana, using the procedure often referred to as "key to tape". The quality of the punching was controlled to an error rate of one-half of one percent of the data fields.

C. RESULTS OF THE MATCHING

The matching of farms was intended as a device to control, or hold constant, certain variables so that credit-related changes for the BANDESA farms could be studied more carefully. It appears from the results of the matching that a NON-BANDESA group of farmers that is remarkably similar to the BANDESA group was identified. In this section some of these similarities are examined.

1. Comparison of the BANDESA and NON-BANDESA Farmers - This survey was intended to uncover differences in various indicators of farmer performance associated with credit use. In the body of this report the "impact" of credit on several measures of employment, income, and output is reported. Although causality is never easy to establish, we did try in this survey to control several possible causes of changes in employment, income, and output. Among the more obvious of these potential causal factors are farmer's age, education level, family size and distance to market. These variables, which would not normally be affected by the impact of credit, can be shown to have been equal at the time of the survey for BANDESA and NON-BANDESA farms by testing statistically for differences between the means and variances of the two groups. If this particular group of variables were equal at the time of the survey, it would not be unreasonable to assume they were equal when the BANDESA Program was begun.

To test the hypothesis that $\mu_B \neq \mu_{NB}$ we compute values for the t-statistic as follows:

$$t = \frac{\overline{X}_B - \overline{X}_{NB}}{\sqrt{\frac{s^2_B}{n_B} + \frac{s^2_{NB}}{n_{NB}}}}$$

To test for equality of variances we use the hypothesis $\sigma^2_B \neq \sigma^2_{NB}$ and compute values for the F-statistic below:

$$F = \frac{s^2_B}{s^2_{NB}} \quad \text{if } s^2_B \geq s^2_{NB}$$

or

$$F = \frac{s^2_{NB}}{s^2_B} \quad \text{if } s^2_{NB} > s^2_B$$

For these particular variables, rejection of the above hypotheses should be sufficient evidence that we are dealing with two groups of farmers that are from the same universe with respect to age, education, etc.

Table 102 gives the values of t and F for these five variables: For our purposes, a t-value greater than 1.96 would indicate a significant difference between the means of the BANDESA and NON-BANDESA farms. In Table 102, the t-value is considerably less than 1.96 for all of the five characteristics that describe the farmer, the size of his family and the location of his farm. The F-value ranges from 1.01 to 1.37. An F-value greater than 1.40 would, for our purposes, indicate a significant difference in the variances of these characteristics for the two groups. Therefore, from Table 102, we would conclude that the means and variances of the five characteristics for BANDESA farmers were not significantly different than the means and variances for the NON-BANDESA farmers.

This is an important conclusion. The variables in Table 102 are among the more important of the potential "causal" factors that would affect changes in employment, income and output, with or without access to credit. Since the differences between the two groups with respect to these variables are not significant, we can rule out these factors as the source of any differences observed in employment, income and output for BANDESA and NON-BANDESA farms.

Quite obviously, the BANDESA farmers could be similar with respect to the characteristics in Table 102 and still have natural advantages (or disadvantages) over

Table 102.–Statistical Measures for Comparing BANDESA and NON-BANDESA Farms for Selected Characteristics

Characteristic	Mean		Standard error of the Mean			
	BANDESA	NON BANDESA	BANDESA	NON BANDESA	t Statistic	F Statistic
Age of farmer	45.2	44.4	.512	.510	1.10	1.01
Years of school	3.49	3.28	.115	.098	1.41	1.37
Number of persons in family	6.68	6.41	.108	.100	1.79	1.15
Number of males 12 years old or more in family	2.35	2.31	.050	.048	0.53	1.21
Distance from farm to nearest market (Kilometers)	15.4	13.7	.816	.685	1.60	1.37

the NON-BANDESA farmers. To examine this possibility we shall compare the two groups of farms from the point of view of the following characteristics:

1. Size of the farms
2. Land use on the farms
3. Crops grown on the farms
4. Yields of various crops on the farms

All four of these variables could affect employment, income and output to a great extent. Access to credit could induce changes in any one or all of the variables. If it can be shown, however, that the farms are not different with respect to some or all of these variables, then they, like the variables in Table 102, can be ruled out as the source of any employment, income or output differences.

2. Farm Size The interviewers matched NON-BANDESA farms to BANDESA farms on the basis of the area reported by the BANDESA farmers when they applied for credit for the 1972/1973 crop year. When the BANDESA farmers applied for credit, they reported an average farm size of 8.68 hectares. This is almost exactly equal to the present NON-BANDESA average of 8.60 hectares.

It is unlikely that the entire difference between the average of 8.68 hectares when the BANDESA farmers applied for credit and the average of 10.00 hectares at the time of the survey was due to credit. There is some evidence that a few BANDESA farms reported less than their entire farm size when they applied for credit. Nevertheless, an examination of the difference in the amount of land rented and amount of unimproved land on BANDESA farms as compared to NON-BANDESA farms would indicate that a significant proportion of the difference in farm size was due to the impact of credit.

There are no data on changes in size of farm for NON-BANDESA farms. However, the general trend in Guatemala is toward smaller farms and while the BANDESA and NON-BANDESA farms do not represent the general universe of farms, they were defined by rather broad criteria. In the absence of some outside stimulus, such as credit, a growth in farm size for NON-BANDESA farms would be very surprising.

Under this assumption, it is reasonably clear that the matching did not result in very great natural advantages with respect to size for the BANDESA farms. Much of the difference in average farm size between the two groups was due to a change in the BANDESA farms which was probably credit related. Consequently, other changes related to farm size could also be considered credit induced changes.

3. Land Use - The way in which the land in their farms is used was slightly different for the BANDESA farmers as compared to the NON-BANDESA group at the time of the survey. BANDESA farmers were using more of their land for crops and less for other purposes than were NON-BANDESA farmers. Particularly interesting was the difference in area of unimproved land and forests between BANDESA farmers and the NON-BANDESA group. A summary of the land use distribution is given in Table 103.

Much of the difference in land use may be explained by the greater amount of rented land in the BANDESA farms. Approximately one-half of the difference in farm

Table 103.–Land Use Distribution of the BANDESA and NON-BANDESA Farms

Land Use Class	Percent of farmers reporting item		Percent of land	
	BANDESA	NON-BANDESA	BANDESA	NON-BANDESA
Temporary and permanent crops	99.13	98.64	54.22	48.73
Pasture land, natural and cultivated	24.60	24.68	23.44	24.31
Unimproved land forests, etc.	27.16	28.48	15.21	18.54
Fallow land	9.69	9.69	4.36	5.07
All other uses	33.65	33.67	3.00	3.26

Table 104.–Percent of Land by Land Use Classes in BANDESA and NON-BANDESA Farms and in BANDESA Farms adjusted for Difference in Rented Land

Land Use	BANDESA	NON-BANDESA	BANDESA[1] adjusted for additional rented land
Temporary and permanent crop	54.22	48.73	51.15
Pasture land, natural or cultivated	23.44	24.31	23.58
Unimproved land forests, etc.	15.21	18.54	16.35
Fallow land	4.36	5.07	4.69
All other uses	3.00	3.26	3.22

[1] Adjusted by subtracting the difference in rented land from BANDESA farms with three-fourths from cropland and one-fourth from pastureland.

sizes between the two groups of farmers is due to the greater amount of rented land in BANDESA farms. This additional rented land was almost certainly used exclusively for cropland and pasture land. If the land use distribution for BANDESA farms is adjusted to exclude the difference in amount of rented land, the similarity of the land use patterns of the two groups of farms would be greater (see Table 104).

4. Crop Mix - The crop mix for BANDESA farms is very similar to that of the NON-BANDESA farms. Six crops occupy 87 and 83 percent of the land that is used for temporary or permanent crops. Of these six crops, corn or interplantings of corn with beans, sesame or sorghum occupy 59 and 58 percent of all cropland. For most of the remaining five crops, the percentage of land that is occupied in either case is small and the differences between the two groups are negligible. (See Table 105). There are no crops that are grown exclusively on either BANDESA or NON-BANDESA farms. Cotton farmers, who apparently do not take part in the BANDESA program, do not appear in either group of farmers.

There may be differences in crop mix by size of farm groups or even by small geographic areas where minor crops are important and reliable estimates of differences are difficult to measure. For the entire sample of farms, however, the crop mix patterns at the time of the survey were essentially the same for both groups of farms.

The interviewers were requested to locate NON-BANDESA farms that generally had the crop mix of the BANDESA farms as reported when the BANDESA farmers applied for credit for the 1972/1973 crop year. To compare the actual areas allocated to each crop when application for credit was made and at the time of the

Table 105.–Percent of Cropland in Major Crops on BANDESA and NON-BANDESA Farms

Crop	BANDESA	NON-BANDESA
Corn	40	45
Corn and beans	8	6
Corn and sesame	7	5
Corn and sorghum	4	2
Total corn and interplantings	(59)	(58)
Wheat	7	6
Rice	6	4
Sesame	8	5
Sorghum	3	3
Beans	4	7
Permanent crops	3	6
All other crops	10	11
Total	100	100

survey, proved to be more time consuming than was expected and was done only for a few sub-classes of farms. The crop mix for these sub-classes has changed very little since credit was granted. If these results are indicative of the entire sample, the NON-BANDESA farms were matched very closely to the BANDESA farms from the point of view of crop mix.

5. Crop Yields - Table 106 shows that crop yields for major crops were nearly identical for BANDESA and NON-BANDESA farms. Interplanted crops and sorghum were exceptions with BANDESA farmers reporting slightly higher yields for interplanted crops and slightly lower yields for sorghum. However, yield data for interplanted crops should be used cautiously since reporting

Table 106.–Crop Area and Yields of Major Crops on BANDESA and NON-BANDESA Farms

Crop	BANDESA		NON-BANDESA	
	Area	Yield (kg/ha)	Area	Yield (kg/ha)
Total cropland	35,801		27,553	
Corn	14,276	1840	12,444	1840
Corn & beans	3,018	1298 (corn) 464 (beans)	1,734	1181 (corn) 367 (beans)
Corn & sesame	2,679	1733 (corn) 407 (sesame)	1,366	1662 (corn) 201 (sesame)
Corn & Sorghum	1,289	1407 (corn) 756 (sorghum)	497	1147 (corn) 782 (sorghum)
Rice	2,133	1935	1,100	1957
Wheat	2,552	1313	1,565	1305
Sorghum	1,152	1351	962	1653
Beans	1,328	819	1,941	775
Other	7,374		5,947	

error for this type of cultivation can be high. Also some of these differences may not be statistically significant. Taking all crops into consideration, the hypothesis that crop yields of the two groups are different would have to be rejected.

Of the crops grown by BANDESA and NON-BANDESA farmers that do not appear in Table 106, none appeared in the sample with sufficient frequency that a reliable estimate of differences in yields could be made. The data show no pattern that would permit a conclusion that, in general, the performance of one group of farmers was better than that of the other group with respect to yields of minor crops.

6. Other Characteristics - The characteristics discussed in this appendix are those that are most important for comparing two groups of farms. There are other important characteristics (e.g., livestock, mechanization), however, and the reader interested in a more detailed comparison of the BANDESA and NON-BANDESA farms is referred to the tables in General Working Document #50 and Statistical Working Document #18. These documents show that for those characteristics that are not credit related, the BANDESA and NON-BANDESA farms are surprisingly similar.

7. General Conclusion on the Matching Operation - The matching operation was quite successful. The interviewers identified a NON-BANDESA group of farmers with the same age, education, family size, location of farms, etc. as was found in the BANDESA group. The two groups of farmers grew the same crops and obtained the same yields. BANDESA farms were larger, probably because of the credit program, and this created a slight difference in the land use pattern.

The two groups of farms were not randomized groups, and because of the circumstances of the credit program, could not be randomized. Therefore, the comparisons were not statistically "pure". Because of this, the argument may be made that the two groups might have been different when the credit program was initiated. That is, the credit related changes might have resulted in the two groups becoming similar. Given the great amount of similarity that exists, such a phenomenon would be highly unlikely. A much more plausible explanation would be that changes requiring a higher level of technology, such as increased yield, simply have not materialized during the short life of the credit program. In all likelihood, the two groups of farms were alike when the credit program began and still retain a great amount of this similarity.

Even with two randomized groups, the analyst has to take certain risks of drawing incorrect conclusions from the data. If conclusions are carefully drawn from the BANDESA - NON-BANDESA comparisons, we are of the opinion that the risk of drawing the wrong conclusion should not be appreciably greater than that when using truly randomized groups.

D. LIMITATIONS OF THE SAMPLE OF NON-BANDESA FARMS

The NON-BANDESA farmers are a control group against which the BANDESA farmers can be compared and as such are representative of no particular universe. When using the data from the Guatemala Small Farmer Credit Survey, it may be tempting to expand the results from the NON-BANDESA farms and use them to represent the general universe of farms. This obviously would be risky, since NON-BANDESA farmers were selected because of their similarity in age, size of farm, etc., to the BANDESA group and would represent all farms in the nation only if the BANDESA group were representative of all farms.

There is evidence that, although broad criteria might have been used in selecting participants for the BANDESA program, important differences exist between them and the general universe of farms in Guatemala. The distribution of farmers by age, education, size of farm, etc., may actually be quite close to the distribution of all farmers in the country. However, BANDESA loans are not made to very large farmers, farmers who grow certain crops, or to most farmers such as older women and younger people of both sexes who may be high credit risks. Thus, the sample fails to reflect this part of the general universe of farms.

The matching of the NON-BANDESA farmers resulted in the exclusion from this control group of essentially the same types of farmers that were excluded from the BANDESA program. We would, therefore, have to reject the notion that the NON-BANDESA sample could be used to make *statistical* inferences for the entire universe of no-credit farms in Guatemala.

It may also be suggested that the NON-BANDESA farmers represent *all* farmers who would qualify for the BANDESA program. This assumption, too, would be risky, since the BANDESA farmers themselves may not be representative of the group in the proportions in which they occur in the entire universe of such farms. Normal statistical practices would indicate that the NON-BANDESA group of farmers may be used only for

the purposes of comparison with the BANDESA group and even then, such comparison would be made carefully.

The limitations described above have been ignored in a few cases in the body of this report. Some conclusions were made for the entire universe of small farms in Guatemala from data collected in the Small Farmer Credit Survey on topics (e.g., credit demand and technical assistance) which the author felt were important to discuss and for which alternative data did not exist. The author was, however, aware of the risk involved in using the data in this manner, and attempted to reduce this risk when possible, by taking into consideration independent information from knowledgeable persons, trends in other Latin American countries, etc., before drawing his conclusions. It was generally concluded that the risk of violating the limitations of the data was more than offset by the enhanced usefulness of the report when these topics were included.

FORM LASA-AG-1
(1-15-74)

ENCUESTA DEL SECTOR PUBLICO AGRICOLA

ENERO 1974

DATOS CORRESPONDIENTES AL AÑO AGRICOLA 1973

CONFIDENCIAL – Toda la información de esta encuesta será estrictamente confidencial. Los datos que se solicitan en ningun caso tienen fines fiscales y tampoco pueden utilizarse como prueba judicial.

	PARA USO DE LA OFICINA
a. Departamento	
b. Region	
c. Sub-region	
d. Parcelamiento	
e. Distrito de Riego	

f. Grupo	g. Cuestionario No.	h. Peso

SECCION I – EL PRODUCTOR Y LOCALIZACION DE LA FINCA

IDENTIFICACION DEL PRODUCTOR

1. ¿Cuál es el nombre de la persona responsable por la siembra y cosecha o por crianza de ganado en esta finca?

Nombres	Apellidos	
	Paterno	Materno

Localización de la finca *(Dirección)* _____

2a. ¿Edad del agricultor?	001
b. ¿Grado a que llegó el agricultor en la escuela?	002
c. ¿El agricultor sabe	003 1 Leer? 2 Escribir? 3 Leer y escribir?
d. Aparte de la escuela usual y anteriormente a este año, ¿ha tenido el agricultor algun entrenamiento técnico formal (ha tamado instrucción), ha recibido asistencia técnica del Servicio de Extensión del Estado, de alguna universidad, compañía privada, o de algún otro grupo o entidad, ha asistido a exhibiciones agrícolas, etc.?	004 1 Sí 2 No

TAMAÑO DE LA FAMILIA

3a. ¿Cuántas personas viven actualmente en su finca, incluyendo su propia familia, familiares, amigos y otros que viven y comen con usted? TOTAL ⟶	005
b. ¿Cuántas tienen más de 64 años?	006
c. ¿Cuántas son hombres de 12 a 64 años?	007
d. ¿Cuántas son mujeres de 12 a 64 años?	008
e. ¿Cuántas son menores de 12 años?	009

SECCION I – EL PRODUCTOR Y LOCALIZACION DE LA FINCA – Continuación

DISTANCIA AL CENTRO DE LAS COMPRAS Y LAS VENTAS	
4a. ¿Cuál es la distancia al centro donde hace la mayoría de las compras y las ventas?	010 KM
b. ¿En vías pavimentadas?	011 KM
c. ¿Otras vías transitables por vehículos?	012 KM
d. ¿De la finca a una vía transitable por vehículos?	013 KM
e. ¿Horas de viaje?	014 H M
f. ¿Veces al mes que viaja?	015

ANOTACIONES

SECCION II – AREA, UTILIZACION DE LA TIERRA, TENENCIA Y TIPO DE LA TIERRA

5. ¿Cuántas parcelas de tierra separadas utiliza usted actualmente, incluyendo terreno propio, arrendado o por el cual no paga? No incluya parcelas arrendadas o usadas sin pago por otros.	016
6. Incluyendo todas estas parcelas, pero excluyendo tierras arrendadas o usadas sin cobro por otros, ¿cuál es el area de tierra que usted utiliza actualmente?	PARA USO DE LA OFICINA

Manzanas	Y	Cuerdas	de	Varas

Otra unidad	
Número	Unidad

	017
	018

TENENCIA

7. Del área que usted actualmente utiliza, ¿cuánta es –	019
a. De su propiedad, no incluyendo tierra arrendada por otros?	020
b. Arrendada por usted de alguna persona, a quién le paga en efectivo?	021
c. Arrendada por usted de alguna persona, quién recibe en pago parte de la cosecha?	022
d. Colonato?	023
e. Propiedad de otra persona privada pero utilizada por usted sin pagar arrendamiento?	024
f. Otras formas de tenencia, como uso común de la tierra, cooperativa, etc.? *Especifique* _____	025
g. **TOTAL** *(Este total deberá ser igual al total en 6)* ⟶	

UTILIZACION DE LA TIERRA

8. ¿Cuántas de estas (unidad en 6) en su finca están utilizadas para –	026
a. Cultivos Temporales – como fríjol, arroz, maíz, etc., que deben ser plantados de nuevo cada cosecha, excluyendo huertos?	027
b. Huertos?	028
c. Cultivos Permanentes – como banano, pera, durazno, etc., que no requieren nueva siembra después de cada cosecha?	029
d. Pastos Cultivados – pasto sembrado como pangola, trébol, pasto del tipo Sudán, etc.?	030
e. Pasto Natural – incluyendo pasto natural mejorado con fertilizante o en otra forma?	031
f. Monte y Bosque – incluyendo los que se usan como pasto para animales?	032
g. Tierra en Descanso – para mejorar su productividad? (No incluya la tierra que está simplemente esperando que principie la estación de siembra.)	033
h. Otros Usos – como casas, canstrucciones para animales, carreteras, zanjas para irrigación, tierra no utilizada, etc.?	034
i. **TOTAL** *(Este total deberá ser igual al total en 6)* ⟶	

SECCION II – AREA, UTILIZACION DE LA TIERRA, TENENCIA Y TIPO DE LA TIERRA – Continuación

9. ¿Cómo adquirió usted su tierra?	035 1 [ ] Compra 2 [ ] Herencia 3 [ ] Reforma agraria 4 [ ] Otra manera
TOPOGRAFIA DE LA TIERRA 10. Aproximadamente, ¿qué superficie de su finca es – a. Plana?	036
b. Ondulada?	037
c. Quebrada?	038
d. **TOTAL** *(Este total deberá ser igual al total en 6)* ⟶	039
CULTIVOS MULTIPLES 11. ¿Cuántas unidades de superficie de su finca fueron sembradas más de una vez durante 1973?	040

ANOTACIONES

SECCION III – CULTIVOS EN 1973

12a. ¿Qué cultivos temporales sembró en su finca durante 1973?

11	Trigo	26	Lechuga
12	Maíz	27	Cebolla
13	Arroz	28	Coliflor
14	Ajonjolí	29	Rábano
15	Maicillo	30	Tomate
16	Pepino	31	Papas
17	Sandía	32	Zanahoria
18	Melón	33	Algodón
19	Fresas	34	Pastos artificiales o mejorados
20	Fríjol		_____
21	Arveja		_____
22	Habas		_____
23	Maní		_____
24	Soya		_____
25	Coles		_____

b. ¿Qué cultivos permanentes había en su finca durante 1973?

51	Peras	59	Limón
52	Manzanas	60	Yuca
53	Naranja	61	Piña
54	Duraznos	62	Caña
55	Café		_____
56	Mandarina		_____
57	Aguacate		_____
58	Plátano		_____

c. Número de cultivos ——→

PARA USO DE LA OFICINA

(041)

(042)

(043)

ENTREVISTADOR > Transfiera cada nombre de cultivo de la Sección III a uno de los juegos de preguntas en la Sección IV antes de continuar la entrevista. Si hay más de 5 cultivos, adjunte juegos adicionales de la Sección IV a este cuestionario según el número de cultivos principiando con el número 6.

ANOTACIONES

SECCION IV – COSTOS DE PRODUCCION

CULTIVO 1

13a. Número y nombre del cultivo

1

Número Nombre

b. ¿Cuál fue la variedad del cultivo?

PARA USO DE LA OFICINA

044 Número	045 Código
1	

046 Código

AREA Y PRODUCCION

14. ¿Cuál fue el área dedicada a este cultivo?

Número Unidad de medida

047 Número	048 Código

15. ¿Cuál fue la producción total cosechada de este cultivo?

Cantidad Unidad de medida

049 Cantidad	050 Código

ENTREVISTADOR > Si este es un cultivo permanente, omita pregunta 16, pasando a 17.

16. ¿En qué mes se –

a. Sembró este cultivo? . . . . . 051 Número del mes

b. Cosechó este cultivo? . . . . . 052 Número del mes

ENTREVISTADOR > Si hubo una segunda siembra de este cultivo, escriba el nombre del cultivo en un segundo juego de preguntas en la Sección IV, asignándole un número distinto. Trate la segunda siembra como un cultivo separado, repitiendo las preguntas de la Sección IV.

17a. ¿Con cuáles otros cultivos fue este cultivo intercalado?

Nombres

053	054 Número	055 Número
0 Ninguno		

Si fue intercalado

b. ¿Fue (cultivo en 13) el cultivo principal?

056 1 Sí 2 No

ENTREVISTADOR > Esté seguro que cultivos secundarios estén incluídos en la Sección IV como actividades separadas. Si hay cultivos secundarios haga las preguntas 23 a 36 una vez como si hubiera sólo un cultivo, poniendo las respuestas bajo el cultivo principal.

Si el cultivo de referencia ahora es un cultivo temporal, omita las preguntas 18 y 19, pasando a 20.

18. ¿Cuál es el área sembrada y la edad promedia de árboles (o viñedos) –

	057 Area	058 Edad
a. En producción?		
b. Todavía no en producción?	059 Area	060 Edad

19. ¿Cuál es el número de árboles (o viñedos) que están –

	061
a. En producción?	
b. Todavía no en producción?	062

SECCION IV - COSTOS DE PRODUCCION – Continuación

ENTREVISTADOR > Esté seguro que se use la misma unidad en pregunta 20 que se usó en pregunta 15.

USO DE LA PRODUCCION

20. ¿Cuánto de (cultivo en 13) fue utilizado o guardado para –

a. Semillas para siembra de nuevos cultivos o alimento para sus animales?	063
b. Consumo en su finca?	064
c. Eloboracion?	065
d. Pago al terrateniente u otros para el uso de la tierra u otros tipos de arrendamiento?	066
e. Venta a otros en efectivo?	067
f. Venta a otros no en efectivo, incluyendo lo vendido para semillas o alimento para animales y lo negociado por artículos o servicios, excluyendo arrendamiento?	068
g. ¿Cuánto fue donado como semillas, para consumo o como alimento para animales, a sus amigos, parientes, etc.?	069
h. ¿Cuánto se perdió, se dañó o fue robado después de la cosecha?	070
i. TOTAL → *(Este total deberá ser igual al total en 15.)*	071

21a. ¿Cuánto recibió en efectivo por la cosecha que vendió?	072 Q
b. ¿A quién vendió su cosecha?	073 1 Al INDECA 2 Al intermediario 3 Al consumidor

INSUMOS

Ahora quisiera hacerle unas preguntas sobre sus gastos incurridos en este cultivo en 1973. Recuerde que estamos hablando únicamente sobre (área en 14) de (cultivo en 13). Si usted no sabe cuáles fueron sus gastos separadamente en este cultivo, sírvase estimarlos lo mejor que pueda.

22a. ¿Cuál fue la cantidad y valor total de las semillas compradas que utilizó en (cultivo en 13) en 1973?	074 KG	075 Valor Q
b. ¿Cuál fue la cantidad total de las semillas no compradas (guardadas de producción anterior o de otras fuentes) que utilizó en 1973?	076 KG	
c. ¿Cuál fue la cantidad total de las matas o arbolitos que utilizó en 1973?	077 Número	
d. Si se compraron, ¿cuál fue el valor total de estas matas o arbolitos?	078 Q	

ENTREVISTADOR > ¿Este es un cultivo intercalado secundario?

☐ Sí – *Pase al próximo cultivo* ☐ No – *Continue*

SECCION IV – COSTOS DE PRODUCCION – Continuación

23a. ¿Se utilizaron fertilizantes, insecticidas, herbicidas, fungicidas o plaguicidas en este cultivo en 1973? . . . . . 079 (1) Sí – *Siga a 23b* (2) No – *Pase a 24*

b. ¿Cuánto se utilizó de urea en este cultivo?	080 KG	081 Costo Q
c. ¿Qué cantidad de otros fertilizantes químicos se usó en este cultivo? . .	082 KG	083 Costo Q
d. ¿Cal y otros correctivos?	084 KG	085 Costo Q
e. ¿Insecticidas, herbicidas, y otros químicos utilizados para el control de insectos, hongos, etc.?		086 Costo Q
f. ¿Otros fertilizantes, líquidos para pulverizar, etc.?		087 Costo Q
g. COSTO TOTAL ⟶		088 Q

24a. ¿Se irrigó este cultivo en 1973?

[ ] Sí – *Siga a 24b* [ ] No – *Pase a 25*

b. ¿En cuánto estimaría usted la cantidad y costo total de agua utilizada para (cultivo en 13)?	089	090 Costo Q

INSUMOS – MAQUINARIA

25. ¿Se utilizó maquinaria agrícola como tractor para preparar la tierra, sembrar o trabajar este cultivo, aplicar fertilizantes o cosechar? . . . . . 091 (1) Sí – *Siga a 26* (2) No – *Pase a 28*

26. ¿La maquinaria fue – 092 (1) Propia? (2) Contratada? (3) Combinada?

ENTREVISTADOR ⟶ En pregunta 27, si el productor no alquiló maquinaria o no sabe el costo del trabajo, solicítele que estime el costo lo mejor que pueda.

27. ¿Cuántas pasadas de maquinaria dieron en la tierra –

a. Para prepara el terreno para la siembra?	093	
(1) ¿En cuánto estimaría el costo total del trabajo?	094	Q
b. Para efectuar la siembra del cultivo?	095	
(1) ¿En cuánto estimaría el costo total del trabajo?	096	Q
c. Para aplicar fertilizantes, insecticidas, otros productos químicos o irrigación al cultivo?	097	
(1) ¿En cuánto estimaría el costo total del trabajo?	098	Q
d. Para cosechar el cultivo?	099	
(1) ¿En cuánto estimaría el costo total del trabajo?	100	Q
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	101	
(1) ¿En cuánto estimaría el costo total del trabajo?	102	Q

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – ANIMALES DE TIRO

28. ¿Se utilizaron animales (bueyes, caballos, etc.) para preparar el terreno, para sembrar o trabajar este cultivo, para aplicar fertilizantes o para la cosecha? — 103
   1 Sí - *Siga a 29*
   2 No - *Pase a 31*

29. ¿Durante cuántos días se utilizaron estos animales para –

a. Preparar el terreno para la siembra?	104
b. Sembrar el cultivo?	105
c. Aplicar fertilizantes u otros productos químicos?	106
d. Cosechar el cultivo?	107
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	108
f. TOTAL →	

Si fueron contratados los animales,

30. ¿Cuál fue el costo promedio por día para su uso?

ENTREVISTADOR > Haga las preguntas 31 a 33 primero para columna (1), luego repita la pregunta separadamente para las columnas (2) a (5). Si todos los trabajadores recibieron la misma paga, debe hacerse una explicación en la sección de anotaciones. Puede ser necesario recordar constantemente al productor de la actividad a la que usted se refiere.

INSUMOS – MANO DE OBRA	Preparó la tierra para siembra? (1)	Sembró (2)	Aplicó fertilizantes o irrigación al cultivo? (3)	Cultivó, podó o, desyerbó el cultivo? (4)	Cosechó, incluyendo empaque y transporte desde el campo? (5)
31. ¿Durante qué mes usted – *Escriba el número del mes aquí* →	111	112		114	115
32. ¿Cuántos jornales pagados se utilizaron en esta actividad?	116	117		119	120
33. ¿Cuántos jornales no pagados se utilizaron en esta actividad, incluyendo el trabajo de usted mismo y otros miembros de su familia?	121	122	123	124	125

34. ¿Cuál fue el valor promedio de un jornal pagado –	126
a. Sin comida?	Q
(1) ¿Cuál fue el número de jornales sin comida?	127
b. Con comida?	128 Q
(1) ¿Cuál fue el número de jornales con comida?	129

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – COSTOS DE MERCADEO

35. ¿Para (cultivo en 13) cuál fue –

a. El valor de las empaques, cajas, sacos, etc., usados? . . . . . 130 Q

b. El costo del transporte de la cosecha de la finca al mercado por animal? 131 Q

c. El costo del transporte de la cosecha de la finca al mercado por vehículo de motor? . . . . . 132 Q

36a. ¿Tuvo usted otros gastos de transporte para (cultivo en 13) tal como el transporte de semillas, abono, etc., del mercado a la finca?

Sí – *Siga a 36b* ☐ No – *Pase a 37*

b. ¿Cuál fue el costo por animal? . . . . . 133 Q

c. ¿Cual fue el costo por vehículo de motor? . . . . . 134 Q

37. ¿Pago usted otros gastos de mercadeo, tales como comisiones sobre ventas, para (cultivo en 13)?

Sí – ¿Cuál fue el costo? 135

No Q

38. TOTAL DE GASTOS DE MERCADEO
(Sume 35, 36, y 37) → 136 Q

INSUMOS – CREDITO

39. ¿Qué cantidad de crédito utilizó en 1973 para cultivo, obtenido de –

a. BANDESA . . . . . 137 Q

b. Otro banco? *(Nombre del banco)* _____ 138 Q

c. Cooperativas? . . . . . 139 Q

d. Compradores o vendedores de sus productos? . . . . . 140 Q

e. Amigos y familiares? . . . . . 141 Q

f. Otros? *(Especifique)* _____ 142 Q

g. TOTAL → 143 Q

ASISTENCIA TECNICA

40. ¿Recibió usted en 1973 cualquier consejo técnico sobre cómo producir este cultivo de parte del Servicio de Extensión del Gobierno, una universidad, compañía privada u otro grupo especial? 144

1 Sí – *Siga a 41*

2 No – *Pase al próximo cultivo*

41. ¿Qué clase de consejo técnico?

a. Demostraciones . . . . . 145 Número

b. Clases . . . . . 146 Número

c. Visitas . . . . . 147 Número

SECCION IV – COSTOS DE PRODUCCION

CULTIVO 2

13a. Número y nombre del cultivo

2

Número _____ Nombre _____

b. ¿Cuál fue la variedad del cultivo?

_____

PARA USO DE LA OFICINA

148 Número **2** | 149 Código

150

AREA Y PRODUCCION

14. ¿Cuál fue el área dedicada a este cultivo?

Número _____ Unidad de medida _____

151 Número | Código

15. ¿Cuál fue la producción total cosechada de este cultivo?

Cantidad _____ Unidad de medida _____

153 Cantidad | 154 Código

ENTREVISTADOR > Si este es un cultivo permanente, omita pregunta 16, pasando a 17.

16. ¿En qué mes se –

a. Sembró este cultivo? 155

b. Cosechó este cultivo? 156

ENTREVISTADOR > Si hubo una segunda siembra de este cultivo, escriba el nombre del cultivo en un segundo juego de preguntas en la Sección IV, asignándole un número distinto. Trate la segunda siembra como un cultivo separado, repitiendo las preguntas de la Sección IV.

17a. ¿Con cuáles otros cultivos fue este cultivo intercalado?

Nombres _____

157 Número | 158 Número | 159 Número

Si fue intercalado

b. ¿Fue (cultivo en 13) el cultivo principal?

160 1 Sí 2 No

ENTREVISTADOR > Esté seguro que cultivos secundarios estén incluídos en la Sección IV como actividades separadas. Si hay cultivos secundarios haga las preguntas 23 a 36 una vez como si hubiera sólo un cultivo, poniendo las respuestas bajo el cultivo principal.

Si el cultivo de referencia ahora es un cultivo temporal, omita las preguntas 18 y 19, pasando a 20.

18. ¿Cuál es el área sembrada y la edad promedia de árboles (o viñedos) –

a. En producción? . . . . . 161 Area | 162 Edad

b. Todavía no en producción? . . . . . 163 Area | 164 Edad

19. ¿Cuál es el número de árboles (o viñedos) que están –

a. En producción? 165

b. Todavía no en producción? 166

SECCION IV – COSTOS DE PRODUCCION – Continuación

ENTREVISTADOR > Esté seguro que se use la misma unidad en pregunta 20 que se usó en pregunta 15.

USO DE LA PRODUCCION

20. ¿Cuánto de (cultivo en 13) fue utilizado o guardado para –

a. Semillas para siembra de nuevos cultivos o alimento para sus animales?	167
b. Consumo en su finca?	168
c. Elaboracion?	169
d. Pago al terrateniente u otros para el uso de la tierra u otros tipos de arrendamiento?	170
e. Venta a otros en efectivo?	171
f. Venta a otros no en efectivo, incluyendo lo vendido para semillas o alimento para animales y lo negociado por artículos o servicios, excluyendo arrendamiento?	172
g. ¿Cuánto fue donado como semillas, para consumo o como alimento para animales, a sus amigos, parientes, etc.?	173
h. ¿Cuánto se perdió, se dañó o fue robado después de la cosecha?	174
i. TOTAL → *(Este total deberá ser igual al total en 15.)*	175

21a. ¿Cuánto recibió en efectivo por la cosecha que vendió? 176 Q

b. ¿A quién vendió su cosecha? 177
1 Al INDECA
2 Al intermediario
3 Al consumidor

INSUMOS

Ahora quisiera hacerle unas preguntas sobre sus gastos incurridos en este cultivo en 1973. Recuerde que estamos hablando únicamente sobre (área en 14) de (cultivo en 13). Si usted no sabe cuáles fueron sus gastos separadamente en este cultivo, sírvase estimarlos lo mejor que pueda.

22a. ¿Cuál fue la cantidad y valor total de las semillas compradas que utilizó en (cultivo en 13) en 1973?	178 KG	179 Valor Q
b. ¿Cuál fue la cantidad total de las semillas no compradas (guardadas de producción anterior o de otras fuentes) que utilizó en 1973?	180 KG	
c. ¿Cuál fue la cantidad total de las matas o arbolitos que utilizó en 1973?	181 Número	
d. Si se compraron, ¿cuál fue el valor total de estas matas o arbolitos?	182 Q	

ENTREVISTADOR > ¿Este es un cultivo intercalado secundario?

☐ Sí – *Pase al próximo cultivo* ☐ No – *Continue*

SECCION IV – COSTOS DE PRODUCCION – Continuación

23a. ¿Se utilizaron fertilizantes, insecticidas, herbicidas, fungicidas o plaguicidas en este cultivo en 1973? 183
1 Sí – Siga a 23b
2 No – Pase a 24

b. ¿Cuánto se utilizó de urea en este cultivo? . . . . . 184 KG 185 Q

c. ¿Qué cantidad de otros fertilizantes químicos se usó en este cultivo? . . 186 KG 187 Q

d. ¿Cal y otros correctivos? . . . . . 188 KG 189 Costo Q

e. ¿Insecticidas, herbicidas y otros químicos utilizados para el control de insectos, hongos, etc.? . . . . . 190 Costo Q

f. ¿Otros fertilizantes, líquidos para pulverizar, etc.? . . . . . 191 Costo Q

g. COSTO TOTAL → 192 Q

24a. ¿Se irrigó este cultivo en 1973?
1 Sí
2 No – Pase a 25

b. ¿En cuanto esté disponible la cantidad y costo total de agua utilizada para [illegible] . . . . . 193 194 Costo 195 Q

INSUMOS – MAQUINARIA

25. ¿Se utilizó maquinaria como tractor para preparar la tierra, sembrar o trabajar este cultivo, aplicar fertilizantes o cosechar? 196
1 Sí – Siga a 26
2 No – Pase a 28

26. ¿La maquinaria fue –
1 Propia?
2 Contratada?
3 Combinada?

ENTREVISTADOR > En pregunta 27, si el productor no alquiló maquinaria o no sabe el costo del trabajo, solicítele que estime el costo lo mejor que pueda.

27. ¿Cuántas pasadas de maquinaria dieron en la tierra –

a. Para prepara el terreno para la siembra? 197

(1) ¿En cuánto estimaría el costo total del trabajo? . . . . . 198 Q 199

b. Para efectuar la siembra del cultivo? 200

(1) ¿En cuánto estimaría el costo total del trabajo? . . . . . Q 201

c. Para aplicar fertilizantes, insecticidas, otros productos químicos o irrigación al cultivo? 202

(1) ¿En cuánto estimaría el costo total del trabajo? . . . . . Q 203

d. Para cosechar el cultivo? 204

(1) ¿En cuánto estimaría el costo total del trabajo? . . . . . Q 205

e. Otros usos (cultivar, desyerbar, aparcar, etc.)? 206

(1) ¿En cuánto estimaría el costo total del trabajo? . . . . . Q

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – ANIMALES DE TIRO

28. ¿Se util[illegible] animales (bueyes, caballos, etc.) para preparar el terreno, [illegible] o trabajar este cultivo, para aplicar fertilizantes o para [illegible]?

207 — 1 Sí – Siga a 29 / 2 No – Pase a 31

29. Durante cuántos días se utilizaron estos animales para –

a. Preparar el terreno para la siembra?	208
b. Sembrar el cultivo?	209
c. Aplicar fertilizantes u otros productos químicos?	210
d. Cosechar el cultivo?	211
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	212
f. TOTAL →	213

Si fueron contratados los animales,

30. ¿Cuál fue el costo promedio por día para su uso? — 214 — Q

ENTREVISTADOR: Haga las preguntas 31 a 33 primero para columna (1); luego repita las preguntas separadamente para las columnas (2) a (5). Si todos los trabajadores no obtuvieron la misma paga, debe hacerse una explicación en la sección de anotaciones. Puede ser necesario recordar constantemente al productor de la actividad a la que usted se refiere.

INSUMOS – MANO DE OBRA	Preparó la tierra para siembra? (1)	Sembró (2)	Aplicó fertilizantes o irrigacion al cultivo? (3)	Cultivó, podó o, desyerbó el cultivo? (4)	Cosechó, incluyendo empaque y transporte desde el campo? (5)
31. ¿Durante qué mes usted – *Escriba el número del mes aquí* →	215	216	217	218	219
32. ¿Cuántos jornales pagados se utilizaron en esta actividad?	220	221	222	223	224
33. ¿Cuántos jornales no pagados se utilizaron en esta actividad, incluyendo el trabajo de usted mismo y otros miembros de su familia?	225	226	227	228	229

34. ¿Cuál fue el valor promedio de un jornal pagado –	
a. Sin comida?	230 — Q
(1) ¿Cuál fue el número de jornales sin comida?	231
b. Con comida?	232 — Q
(1) ¿Cuál fue el número de jornales con comida?	233

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – COSTOS DE MERCADEO

35. ¿Para (cultivo en 13) cuál fue –

a. El valor de los empaques, cajas, sacos, etc., usados? . . . . . 234 Q

b. El costo del transporte de la cosecha de la finca al mercado por animal? 235 Q

c. El costo del transporte de la cosecha de la finca al mercado por vehículo de motor? . . . . . 236 Q

36a. ¿Tuvo usted otros gastos de transporte para (cultivo en 13) tal como el transporte de semillas, abono, etc., del mercado a la finca?

[ ] Sí – *Siga a 36b* [ ] No – *Pase a 37*

b. ¿Cuál fue el costo por animal? . . . . . 237 Q

c. ¿Cual fue el costo por vehículo de motor? . . . . . 238 Q

37. ¿Pagó usted otros gastos de mercadeo, tales como comisiones sobre ventas, para (cultivo en 13)?

[ ] Sí – ¿Cuál fue el costo? 239

[ ] No Q

38. **TOTAL DE GASTOS DE MERCADEO** *(Sume 35, 36, y 37)* → 240 Q

INSUMOS – CREDITO

39. ¿Qué cantidad de crédito utilizó en 1973 para este cultivo, obtenido de –

a. BANDESA . . . . . 241 Q

b. Otro banco? *(Nombre del banco)* _____ 242 Q

c. Cooperativas? . . . . . 243 Q

d. Compradores o vendedores de sus productos? . . . . . 244 Q

e. Amigos y familiares? . . . . . 245 Q

f. Otros? *(Especifique)* _____ 246 Q

g. **TOTAL** → 247 Q

ASISTENCIA TECNICA

40. ¿Recibió usted en 1973 cualquier consejo técnico sobre cómo producir este cultivo de parte del Servicio de Extensión del Gobierno, una universidad, compañía privada u otro grupo especial? 248

1 Sí – *Siga a 41*

2 No – *Pase al próximo cultivo*

41. ¿Qué clase de consejo técnico?

a. Demostraciones . . . . . 249 Número

b. Clases . . . . . 250 Número

c. Visitas . . . . . 251 Número

SECCION IV – COSTOS DE PRODUCCION

CULTIVO 3

13a. Número y nombre del cultivo

3

Número _____ Nombre

b. ¿Cuál fue la variedad del cultivo?

_____

PARA USO DE LA OFICINA

252 Número	253 Código
3	

254 Código

AREA Y PRODUCCION

14. ¿Cuál fue el área dedicada a este cultivo?

_____

Número Unidad de medida

255 Número	256 Código

15. ¿Cuál fue la producción total cosechada de este cultivo?

_____

Cantidad Unidad de medida

257 Cantidad	258 Código

ENTREVISTADOR > Si este es un cultivo permanente, omita pregunta 16, pasando a 17.

16. ¿En qué mes se –

a. Sembró este cultivo? . . . . . 259 Número del mes

b. Cosechó este cultivo? . . . . . 260 Número del mes

ENTREVISTADOR > Si hubo una segunda siembra de este cultivo, escriba el nombre del cultivo en un segundo juego de preguntas en la Sección IV asignándole un número distinto. Trate la segunda siembra como un cultivo separado, repitiendo las preguntas de la Sección IV.

17a. ¿Con cuáles otros cultivos fue este cultivo intercalado? _____ Nombres

261 0 Ninguno	262 Número	263 Número

Si fue intercalado

b. ¿Fue (cultivo en 13) el cultivo principal?

264 1 Sí 2 No

ENTREVISTADOR > Esté seguro que cultivos secundarios estén incluídos en la Sección IV como actividades separadas. Si hay cultivos secundarios haga las preguntas 23 a 36 una vez como si hubiera sólo un cultivo, poniendo las respuestas bajo el cultivo principal.

Si el cultivo de referencia ahora es un cultivo temporal, omita las preguntas 18 y 19, pasando a 20.

18. ¿Cuál es el área sembrada y la edad promedia de árboles (o viñedos) –

	265 Area	266 Edad
a. En producción?		
b. Todavía no en producción?	267 Area	268 Edad

19. ¿Cuál es el número de árboles (o viñedos) que están –

269
a. En producción? . . . . .
270
b. Todavía no en producción? . . . . .

SECCION IV -- COSTOS DE PRODUCCION -- Continuación

ENTREVISTADOR > Esté seguro que se use la misma unidad en pregunta 20 que se usó en pregunta 15.

USO DE LA PRODUCCION

20. ¿Cuánto de (cultivo en 13) fue utilizado o guardado para –

a. Semillas para siembra de nuevos cultivos o alimento para sus animales?	271
b. Consumo en su finca?	272
c. Elaboracion?	273
d. Pago al terrateniente u otros para el uso de la tierra u otros tipos de orrendamiento?	274
e. Venta a otros en efectivo?	275
f. Venta a otros no en efectivo, incluyendo lo vendido para semillas o alimento para animales y lo negociado por artículos o servicios, excluyendo arrendamiento?	276
g. ¿Cuánto fue donado como semillas, para consumo o como alimento para animales, a sus amigos, parientes, etc.?	277
h. ¿Cuánto se perdió, se dañó o fue robado después de la cosecha?	278
i. **TOTAL** → *(Este total deberá ser igual al total en 15.)*	279

21a. ¿Cuánto recibió en efectivo por la cosecha que vendió?	280 Q
b. ¿A quién vendió su cosecha?	281 1 Al INDECA; 2 Al intermediario; 3 Al consumidor

INSUMOS

Ahora quisiera hacerle unas preguntas sobre sus gastos incurridos en este cultivo en 1973. Recuerde que estamos hablando únicamente sobre (área en 14) de (cultivo en 13). Si usted no sabe cuáles fueron sus gastos separadamente en este cultivo, sírvase estimarlos lo mejor que pueda.

22a. ¿Cuál fue la cantidad y valor total de las semillas compradas que utilizó en (cultivo en 13) en 1973?	282 KG; 283 Valor Q
b. ¿Cuál fue la cantidad total de las semillas no compradas (guardadas de producción anterior o de otras fuentes) que utilizó en 1973?	284 KG
c. ¿Cuál fue la cantidad total de las matas o arbolitos que utilizó en 1973?	285 Número
d. Si se compraron, ¿cuál fue el valor total de estas matas o arbolitos?	286 Q

ENTREVISTADOR > ¿Este es un cultivo intercalado secundario?

☐ Sí – *Pase al próximo cultivo* ☐ No – *Continue*

SECCION IV – COSTOS DE PRODUCCION – Continuación

23a. ¿Se utilizaron fertilizantes, insecticidas, herbicidas, fungicidas o plaguicidas en este cultivo en 1973?	287	1 [ ] Sí – *Siga a 23b* 2 [ ] No – *Pase a 24*	
b. ¿Cuánto se utilizó de urea en este cultivo?	288 KG	289 Q	Costo
c. ¿Qué cantidad de otros fertilizantes químicos se usó en este cultivo? . .	290 KG	291 Q	Costo
d. ¿Cal y otros correctivos?	292 KG	293 Q	Costo
e. ¿Insecticidas, herbicidas, y otros químicos utilizados para el control de insectos, hongos, etc.?		294 Q	Costo
f. ¿Otros fertilizantes, líquidos para pulverizar, etc.?		295 Q	Costo
g. **COSTO TOTAL** ⟶		296 Q	
24a. ¿Se irrigó este cultivo en 1973? [ ] Sí – *Siga a 24b* [ ] No – *Pase a 25*			
b. ¿En cuánto estimaría usted la cantidad y costo total de agua utilizada para (cultivo en 13)?	297 m^3	298 Q	Costo
INSUMOS – MAQUINARIA 25. ¿Se utilizó maquinaria agrícola como tractor para preparar la tierra, sembrar o trabajar este cultivo, aplicar fertilizantes o cosechar?	299	1 Sí – *Siga a 26* 2 No – *Pase a 28*	
26. ¿La maquinaria fue –	300	1 Propia? 2 Contratada? 3 Combinada?	
ENTREVISTADOR > En pregunta 27, si el productor no alquiló maquinaria o no sabe el costo del trabajo, solicítele que estime el costo lo mejor que pueda.			
27. ¿Cuántas pasadas de maquinaria dieron en la tierra – a. Para prepara el terreno para la siembra?	301		
(1) ¿En cuánto estimaría el costo total del trabajo?	302 Q		
b. Para efectuar la siembra del cultivo?	303		
(1) ¿En cuánto estimaría el costo total del trabajo?	304 Q		
c. Para aplicar fertilizantes, insecticidas, otros productos químicos o irrigación al cultivo?	305		
(1) ¿En cuánto estimaría el costo total del trabajo?	306 Q		
d. Para cosechar el cultivo?	307		
(1) ¿En cuánto estimaría el costo total del trabajo?	308 Q		
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	309		
(1) ¿En cuánto estimaría el costo total del trabajo?	310 Q		

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – ANIMALES DE TIRO

28. ¿Se utilizaron animales (bueyes, caballos, etc.) para preparar el terreno, para sembrar o trabajar este cultivo, para aplicar fertilizantes o para la cosecha? — 311: 1 Sí – *Siga a 29*; 2 No – *Pase a 31*

29. ¿Durante cuántos días se utilizaron estos animales para –	
a. Preparar el terreno para la siembra?	312
b. Sembrar el cultivo?	313
c. Aplicar fertilizantes u otros productos químicos?	314
d. Cosechar el cultivo?	315
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	316
f. TOTAL →	317
Si fueron contratados los animales, 30. ¿Cuál fue el costo promedio por día para su uso?	318 Q

ENTREVISTADOR > Haga las preguntas 31 a 33 primero para columna (1), luego repita las preguntas separadamente para las columnas (2) a (5). Si todos los trabajadores no obtuvieron la misma paga, debe hacerse una explicación en la sección de anotaciones. Puede ser necesario recordar constantemente al productor de la actividad a la que usted se refiere.

INSUMOS – MANO DE OBRA	Preparó la tierra para siembra? (1)	Sembró (2)	Aplicó fertilizantes o irrigacion al cultivo? (3)	Cultivó, podó o, desyerbó el cultivo? (4)	Cosechó, incluyendo empaque y transporte desde el campo? (5)
31. ¿Durante qué mes usted – *Escriba el número del mes aquí* →	319	320	321	322	323
32. ¿Cuántos jornales pagados se utilizaron en esta actividad?	324	325	326	327	328
33. ¿Cuántos jornales no pagados se utilizaron en esta actividad, incluyendo el trabajo de usted mismo y otros miembros de su familia?	329	330	331	332	333

34. ¿Cuál fue el valor promedio de un jornal pagado –	
a. Sin comida?	334 Q
(1) ¿Cuál fue el número de jornales sin comida?	335
b. Con comida?	336 Q
(1) ¿Cuál fue el número de jornales con comida?	3

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – COSTOS DE MERCADEO

35. ¿Para (cultivo en 13) cuál fue –

a. El valor de los empaques, cajas, sacos, etc., usados?	338	Q
b. El costo del transporte de la cosecha de la finca al mercado por animal?	339	Q
c. El costo del transporte de la cosecha de la finca al mercado por vehículo de motor?	340	Q

36a. ¿Tuvo usted otros gastos de transporte para (cultivo en 13) tal como el transporte de semillas, abono, etc., del mercado a la finca?

1 Sí – *Siga a 36b* 2 No – *Pase a 37*

b. ¿Cuál fue el costo por animal?	341	Q
c. ¿Cual fue el costo por vehículo de motor?	342	Q

37. ¿Pagó usted otros gastos de mercadeo, tales como comisiones sobre ventas, para (cultivo en 13)?

1 Sí – ¿Cuál fue el costo? . . . . . 343 Q

2 No

38. TOTAL DE GASTOS DE MERCADEO (*Sume 35, 36, y 37*) → 344 Q

INSUMOS – CREDITO

39. ¿Qué cantidad de crédito utilizó en 1973 para este cultivo, obtenido de –

a. BANDESA	345	Q
b. Otro banco? (*Nombre del banco*) _____	346	Q
c. Cooperativas?	347	Q
d. Compradores o vendedores de sus productos?	348	Q
e. Amigos y familiares?	349	Q
f. Otros? (*Especifique*) _____	350	Q
g. TOTAL →	351	Q

ASISTENCIA TECNICA

40. ¿Recibió usted en 1973 cualquier consejo técnico sobre cómo producir este cultivo de parte del Servicio de Extensión del Gobierno, una universidad, compañía privada u otro grupo especial? 352

1 Sí – *Siga a 41*

2 No – *Pase al próximo cultivo*

41. ¿Qué clase de consejo técnico?

a. Demostraciones	353	Número
b. Clases	354	Número
c. Visitas	355	Número

SECCION IV – COSTOS DE PRODUCCION

CULTIVO 4

13a. Número y nombre del cultivo

4

Número _____ Nombre _____

b. ¿Cuál fue la variedad del cultivo?

_____

PARA USO DE LA OFICINA

356 Número: **4** | 357 Código

358 Código

AREA Y PRODUCCION

359 Número | 360 Código

14. ¿Cuál fue el área dedicada a este cultivo?

_____

Número Unidad de medida

361 Cantidad | 362 Código

15. ¿Cuál fue la producción total cosechada de este cultivo?

_____

Cantidad Unidad de medida

ENTREVISTADOR > Si este es un cultivo permanente, omita pregunta 16, pasando a 17.

16. ¿En qué mes se –

a. Sembró este cultivo? . . . . . 363 Número del mes

b. Cosechó este cultivo? . . . . . 364 Número del mes

ENTREVISTADOR > Si hubo una segunda siembra de este cultivo, escriba el nombre del cultivo en un segundo juego de preguntas en la Sección IV, asignándole un número distinto. Trate la segunda siembra como un cultivo separado, repitiendo las preguntas de la Sección IV.

17a. ¿Con cuáles otros cultivos fue este cultivo intercalado? _____ Nombres

365 Número | 366 Número | 367 Número

Si fue intercalado

b. ¿Fue (cultivo en 13) el cultivo principal?

368 1 Sí 2 No

ENTREVISTADOR > Esté seguro que cultivos secundarios estén incluídos en la Sección IV como actividades separadas. Si hay cultivos secundarios haga las preguntas 23 a 36 una vez como si hubiera sólo un cultivo, poniendo las respuestas bajo el cultivo principal.

Si el cultivo de referencia ahora es un cultivo temporal, omita las preguntas 18 y 19, pasando a 20.

18. ¿Cuál es el área sembrada y la edad promedia de árboles (o viñedos) –

a. En producción? . . . . . 369 Area | 370 Edad

b. Todavía no en producción? . . . . . 371 Area | 372 Edad

19. ¿Cuál es el número de árboles (o viñedos) que están –

a. En producción? 373

b. Todavía no en producción? 374

SECCION IV – COSTOS DE PRODUCCION – Continuación

ENTREVISTADOR > Esté seguro que se use la misma unidad en pregunta 20 que se usó en pregunta 15.

USO DE LA PRODUCCION

20. ¿Cuánto de (cultivo en 13) fue utilizado o guardado para –

a.	Semillas para siembra de nuevos cultivos o alimento para sus animales?	375
b.	Consumo en su finca?	376
c.	Elaboracion?	377
d.	Pago al terrateniente u otros para el uso de la tierra u otros tipos de arrendamiento?	378
e.	Venta a otros en efectivo?	379
f.	Venta a otros no en efectivo, incluyendo lo vendido para semillas o alimento para animales y lo negociado por artículos o servicios, excluyendo arrendamiento?	380
g.	¿Cuánto fue donado como semillas, para consumo o como alimento para animales, a sus amigos, parientes, etc.?	381
h.	¿Cuánto se perdió, se dañó o fue robado después de la cosecha?	382
i.	**TOTAL** → *(Este total deberá ser igual al total en 15.)*	383

21a. ¿Cuánto recibió en efectivo por la cosecha que vendió? — 384 Q

b. ¿A quién vendió su cosecha? — 385
1 ☐ Al INDECA
2 ☐ Al intermediario
3 ☐ Al consumidor

INSUMOS

Ahora quisiera hacerle unas preguntas sobre sus gastos incurridos en este cultivo en 1973. Recuerde que estamos hablando únicamente sobre (área en 14) de (cultivo en 13). Si usted no sabe cuáles fueron sus gastos separadamente en este cultivo, sírvase estimarlos lo mejor que pueda.

22a.	¿Cuál fue la cantidad y valor total de las semillas compradas que utilizó en (cultivo en 13) en 1973?	386 KG / 387 Valor Q
b.	¿Cuál fue la cantidad total de las semillas no compradas (guardadas de producción anterior o de otras fuentes) que utilizó en 1973?	388 KG
c.	¿Cuál fue la cantidad total de las matas o arbolitos que utilizó en 1973?	389 Número
d.	Si se compraron, ¿cuál fue el valor total de estas matas o arbolitos?	390 Q

ENTREVISTADOR > ¿Este es un cultivo intercalado secundario?

☐ Sí – *Pase al próximo cultivo* ☐ No – *Continue*

SECCION IV – COSTOS DE PRODUCCION – Continuación

23a. ¿Se utilizaron fertilizantes, insecticidas, herbicidas, fungicidas o plaguicidas en este cultivo en 1973?	391	1 Sí – *Siga a 23b* 2 No – *Pase a 24*	
b. ¿Cuánto se utilizó de urea en este cultivo?	392 KG	393 Costo Q	
c. ¿Qué cantidad de otros fertilizantes químicos se usó en este cultivo?	394 KG	395 Costo Q	
d. ¿Cal y otros correctivos?	396 KG	397 Costo Q	
e. ¿Insecticidas, herbicidas, y otros químicos utilizados para el control de insectos, hongos, etc.?		398 Costo Q	
f. ¿Otros fertilizantes, líquidos para pulverizar, etc.?		399 Costo Q	
g. **COSTO TOTAL** →		400 Q	
24a. ¿Se irrigó este cultivo en 1973? ☐ Sí – *Siga a 24b* ☐ No – *Pase a 25*			
b. ¿En cuánto estimaría usted la cantidad y costo total de agua utilizada para (cultivo en 13)?	401 M³	402 Costo Q	
INSUMOS – MAQUINARIA 25. ¿Se utilizó maquinaria agrícola como tractor para preparar la tierra, sembrar o trabajar este cultivo, aplicar fertilizantes o cosechar?	403	1 Sí – *Siga a 26* 2 No – *Pase a 28*	
26. ¿La maquinaria fue –	404	1 Propia? 2 Contratada? 3 Combinada?	
ENTREVISTADOR > En pregunta 27, si el productor no alquiló maquinaria o no sabe el costo del trabajo, solicítele que estime el costo lo mejor que pueda.			
27. ¿Cuántas pasadas de maquinaria dieron en la tierra – a. Para prepara el terreno para la siembra?	405		
(1) ¿En cuánto estimaría el costo total del trabajo?	406 Q		
b. Para efectuar la siembra del cultivo?	407		
(1) ¿En cuánto estimaría el costo total del trabajo?	408 Q		
c. Para aplicar fertilizantes, insecticidas, otros productos químicos o irrigación al cultivo?	409		
(1) ¿En cuánto estimaría el costo total del trabajo?	410 Q		
d. Para cosechar el cultivo?	411		
(1) ¿En cuánto estimaría el costo total del trabajo?	412 Q		
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	413		
(1) ¿En cuánto estimaría el costo total del trabajo?	414 Q		

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – ANIMALES DE TIRO

28. ¿Se utilizaron animales (bueyes, caballos, etc.) para preparar el terreno, para sembrar o trabajar este cultivo, para aplicar fertilizantes o para la cosecha? — 415: 1 [ ] Sí – *Siga a 29*; 2 [ ] No – *Pase a 31*

29. ¿Durante cuántos días se utilizaron estos animales para –

a. Preparar el terreno para la siembra?	416
b. Sembrar el cultivo?	417
c. Aplicar fertilizantes u otros productos químicos?	418
d. Cosechar el cultivo?	419
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	420
f. TOTAL →	421

Si fueron contratados los animales,

30. ¿Cuál fue el costo promedio por día para su uso? — 422: Q

ENTRE SI PAGAR → Haga las preguntas 31 a 33 primero para columna (1); luego repita las preguntas separadamente para las columnas (2) a (5). Si todos los trabajadores no obtuvieron la misma paga, debe hacerse una explicación en la sección de anotaciones. Puede ser necesario recordar constantemente al productor de la actividad a la que usted se refiere.

INSUMOS – MANO DE OBRA	Preparó la tierra para siembra? (1)	Sembró (2)	Aplicó fertilizantes o irrigacion al cultivo? (3)	Cultivó, podó o, desyerbó el cultivo? (4)	Cosechó, incluyendo empaque y transporte desde el campo? (5)
31. ¿Durante qué mes usted – *Escriba el número del mes aquí* →	423	424	425	426	4.
32. ¿Cuántos jornales pagados se utilizaron en esta actividad?	428	429	430	431	432
33. ¿Cuántos jornales no pagados se utilizaron en esta actividad, incluyendo el trabajo de usted mismo y otros miembros de su familia?	433	434	435	436	437

34. ¿Cuál fue el valor promedio de un jornal pagado – a. Sin comida?	438: Q
(1) ¿Cuál fue el número de jornales sin comida?	439
b. Con comida?	440: Q
(1) ¿Cuál fue el número de jornales con comida?	441

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – COSTOS DE MERCADEO

442

35. ¿Para (cultivo en 13) cuál fue –

a. El valor de los empaques, cajas, sacos, etc., usados? . . . . . Q

443

b. El costo del transporte de la cosecha de la finca al mercado por animal? Q

444

c. El costo del transporte de la cosecha de la finca al mercado por vehículo de motor? . . . . . Q

36a. ¿Tuvo usted otros gastos de transporte para (cultivo en 13) tal como el transporte de semillas, abono, etc., del mercado a la finca?

[ ] Sí – *Siga a 36b* [ ] No – *Pase a 37*

445

b. ¿Cuál fue el costo por animal? . . . . . Q

446

c. ¿Cual fue el costo por vehículo de motor? . . . . . Q

37. ¿Pagó usted otros gastos de mercadeo, tales como comisiones sobre ventas, para (cultivo en 13)?

447

[ ] Sí – ¿Cuál fue el costo? . . . . . Q

[ ] No

38. TOTAL DE GASTOS DE MERCADEO
(Sume 35, 36, y 37) ⟶

448

Q

INSUMOS – CREDITO

449

39. ¿Qué cantidad de crédito utilizó en 1973 para este cultivo, obtenido de –

a. BANDESA . . . . . Q

450

b. Otro banco? *(Nombre del banco)* _____ Q

451

c. Cooperativas? . . . . . Q

452

d. Compradores o vendedores de sus productos? . . . . . Q

453

e. Amigos y familiares? . . . . . Q

454

f. Otros? *(Especifique)* _____ Q

455

g. TOTAL ⟶ Q

ASISTENCIA TECNICA

456

40. ¿Recibió usted en 1973 cualquier consejo técnico sobre cómo producir este cultivo de parte del Servicio de Extensión del Gobierno, una universidad, compañía privada u otro grupo especial?

1 Sí – *Siga a 41*

2 No – *Pase al próximo cultivo*

41. ¿Qué clase de consejo técnico?

457 Número

a. Demostraciones . . . . .

458 Número

b. Clases . . . . .

459 Número

c. Visitas. . . . .

CULTIVO 5

SECCION IV – COSTOS DE PRODUCCION

	PARA USO DE LA OFICINA
13a. Número y nombre del cultivo **5** Número Nombre	460 Número **5** / 461 Código
b. **¿Cuál fue la variedad del cultivo?**	462 Código
AREA Y PRODUCCION	463 Número / 464 Código
14. **¿Cuál fue el área dedicada a este cultivo?** Número Unidad de medida	
15. **¿Cuál fue la producción total cosechada de este cultivo?** Cantidad Unidad de medida	465 Cantidad / 466 Código
ENTREVISTADOR > Si este es un cultivo permanente, omita pregunta 16, pasando a 17.	
16. **¿En qué mes se –** a. **Sembró este cultivo?**	467 Número del mes
b. **Cosechó este cultivo?**	468 Número del mes
ENTREVISTADOR > Si hubo una segunda siembra de este cultivo, escriba el nombre del cultivo en un segundo juego de preguntas en la Sección IV, asignándole un número distinto. Trate la segunda siembra como un cultivo separado, repitiendo las preguntas de la Sección IV.	
17a. ¿Con cuáles otros cultivos fue este cultivo intercalado? _____ Nombres	469 0 Ninguno / 470 Número / 471 Número
Si fue intercalado b. ¿Fue (cultivo en 13) **el cultivo principal?**	472 1 Sí 2 No
ENTREVISTADOR > Esté seguro que cultivos secundarios estén incluídos en la Sección IV como actividades separadas. Si hay cultivos secundarios haga las preguntas 23 a 36 una vez como si hubiera sólo un cultivo, poniendo las respuestas bajo el cultivo principal. Si el cultivo de referencia ahora es un cultivo temporal, omita las preguntas 18 y 19, pasando a 20.	
18. **¿Cuál es el área sembrada y la edad promedia de árboles (o viñedas) –** a. **En producción?**	473 Area / 474 Edad
b. **Todavía no en producción?**	475 Area / 476 Edad
19. **¿Cuál es el número de árboles (o viñedos) que están –** a. **En producción?**	477
b. **Todavía no en producción?**	478

SECCION IV – COSTOS DE PRODUCCION – Continuación

ENTREVISTADOR > Esté seguro que se use la misma unidad en pregunta 20 que se usó en pregunta 15.

USO DE LA PRODUCCION

20. ¿Cuánto de (cultivo en 13) fue utilizado o guardado para –

a. Semillas para siembra de nuevos cultivos o alimento para sus animales?	479	
b. Consumo en su finca?	480	
c. Elaboracion?	481	
d. Pago al terrateniente u otros para el uso de la tierra u otros tipos de arrendamiento?	482	
e. Venta a otros en efectivo?	483	
f. Venta a otros no en efectivo, incluyendo lo vendido para semillas o alimento para animales y lo negociado por artículos o servicios, excluyendo arrendamiento?	484	
g. ¿Cuánto fue donado como semillas, para consumo o como alimento para animales, a sus amigos, parientes, etc.?	485	
h. ¿Cuánto se perdió, se dañó o fue robado después de la cosecha?	486	
i. **TOTAL** → *(Este total deberá ser igual al total en 15.)*	487	

21a. ¿Cuánto recibió en efectivo por la cosecha que vendió?	488	Q
b. ¿A quién vendió su cosecha?	489	1 Al INDECA 2 Al intermediario 3 Al consumidor

INSUMOS

Ahora quisiera hacerle unas preguntas sobre sus gastos incurridos en este cultivo en 1973. Recuerde que estamos hablando únicamente sobre (área en 14) de (cultivo en 13). Si usted no sabe cuáles fueron sus gastos separadamente en este cultivo, sírvase estimarlos lo mejor que pueda.

22a. ¿Cuál fue la cantidad y valor total de las semillas compradas que utilizó en (cultivo en 13) en 1973?	490	KG	491 Valor Q
b. ¿Cuál fue la cantidad total de las semillas no compradas (guardadas de producción anterior o de otras fuentes) que utilizó en 1973?	492	KG	
c. ¿Cuál fue la cantidad total de las matas o arbolitos que utilizó en 1973?	493	Número	
d. Si se compraron, ¿cuál fue el valor total de estas matas o arbolitos?	494	Q	

ENTREVISTADOR > ¿Este es un cultivo intercalado secundario?

☐ Sí – *Pase al próximo cultivo* ☐ No – *Continue*

SECCION IV – COSTOS DE PRODUCCION – Continuación

23a. ¿Se utilizaron fertilizantes, insecticidas, herbicidas, fungicidas o plaguicidas en este cultivo en 1973?	495	1 Sí – *Siga a 23b* 2 No – *Pase a 24*
b. ¿Cuánto se utilizó de urea en este cultivo?	496 KG	497 Costo Q
c. ¿Qué cantidad de otros fertilizantes químicos se usó en este cultivo? . .	498 KG	499 Costo Q
d. ¿Cal y otros correctivos?	500 KG	501 Costo Q
e. ¿Insecticidas, herbicidas, y otros químicos utilizados para el control de insectos, hongos, etc.?		502 Costo Q
f. ¿Otros fertilizantes, líquidos para pulverizar, etc.?		503 Costo Q
g. COSTO TOTAL ⟶		504 Q
24a. ¿Se irrigó este cultivo en 1973? [ ] Sí – *Siga a 24b* [ ] No *Pase a 25*		
b. ¿En cuánto estimaría usted la cantidad y costo total de agua utilizada para (cultivo en 13)?	505 M3	506 Costo Q
INSUMOS – MAQUINARIA 25. ¿Se utilizó maquinaria agrícola como tractor para preparar la tierra, sembrar o trabajar este cultivo, aplicar fertilizantes o cosechar?	507	1 Sí – *Siga a 26* 2 No – *Pase a 28*
26. ¿La maquinaria fue –	508	1 Propia? 2 Contratada? 3 Combinada?
ENTREVISTADOR ⟶ En pregunta 27, si el productor no alquiló maquinaria o no sabe el costo del trabajo, solicítele que estime el costo lo mejor que pueda.		
27. ¿Cuántas pasadas de maquinaria dieron en la tierra – a. Para prepara el terreno para la siembra?	509	
(1) ¿En cuánto estimaría el costo total del trabajo?	510 Q	
b. Para efectuar la siembra del cultivo?	511	
(1) ¿En cuánto estimaría el costo total del trabajo?	512 Q	
c. Para aplicar fertilizantes, insecticidas, otros productos químicos o irrigación al cultivo?	513	
(1) ¿En cuánto estimaría el costo total del trabajo?	514 Q	
d. Para cosechar el cultivo?	515	
(1) ¿En cuánto estimaría el costo total del trabajo?	516 Q	
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	517	
(1) ¿En cuánto estimaría el costo total del trabajo?	518 Q	

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – ANIMALES DE TIRO

28. ¿Se utilizaron animales (bueyes, caballos, etc.) para preparar el terreno, para sembrar o trabajar este cultivo, para aplicar fertilizantes o para la cosecha? — 519
   1 Sí – Siga a 29
   2 No – Pase a 31

29. ¿Durante cuántos días se utilizaron estos animales para –

a. Preparar el terreno para la siembra?	520
b. Sembrar el cultivo?	521
c. Aplicar fertilizantes u otros productos químicos?	522
d. Cosechar el cultivo?	523
e. Otros usos (cultivar, desyerbar, aporcar, etc.)?	524
f. TOTAL →	525

Si fueron contratados los animales,

30. ¿Cuál fue el costo promedio por día para su uso? — 526 Q

ENTREVISTADOR > Haga las preguntas 31 a 33 primero para columna (1); luego repita las preguntas separadamente para las columnas (2) a (5). Si todos los trabajadores no obtuvieron la misma paga, debe hacerse una explicación en la sección de anotaciones. Puede ser necesario recordar constantemente al productor de la actividad a la que usted se refiere.

INSUMOS – MANO DE OBRA	Preparó la tierra para siembra? (1)	Sembró (2)	Aplicó fertilizantes o irrigacion al cultivo? (3)	Cultivó, podó o, desyerbó el cultivo? (4)	Cosechó, incluyendo empaque y transporte desde el campo? (5)
31. ¿Durante qué mes usted – Escriba el número del mes aquí →	527	528	529	530	531
32. ¿Cuántos jornales pagados se utilizaron en esta actividad?	532	533	534	535	536
33. ¿Cuántos jornales no pagados se utilizaron en esta actividad, incluyendo el trabajo de usted mismo y otros miembros de su familia?	537	538	539	540	541

34. ¿Cuál fue el valor promedio de un jornal pagado –	
a. Sin comida?	542 Q
(1) ¿Cuál fue el número de jornales sin comida?	543
b. Con comida?	544 Q
(1) ¿Cuál fue el número de jornales con comida?	545

SECCION IV – COSTOS DE PRODUCCION – Continuación

INSUMOS – COSTOS DE MERCADEO

35. ¿Para (cultivo en 13) cuál fue –

a. El valor de los empaques, cajas, sacos, etc., usados? . . . . . 546 Q

b. El costo del transporte de la cosecha de la finca al mercado por animal? 547 Q

c. El costo del transporte de la cosecha de la finca al mercado por vehículo de motor? . . . . . 548 Q

36a. ¿Tuvo usted otros gastos de transporte para (cultivo en 13) tal como el transporte de semillas, abono, etc., del mercado a la finca?

☐ Sí – *Siga a 36b* ☐ No – *Pase a 37*

b. ¿Cuál fue el costo por animal? . . . . . 549 Q

c. ¿Cual fue el costo por vehículo de motor? . . . . . 550 Q

37. ¿Pagó usted otros gastos de mercadeo, tales como comisiones sobre ventas, para (cultivo en 13)?

☐ Sí – ¿Cuál fue el costo? . . . . . 551 Q

☐ No

38. **TOTAL DE GASTOS DE MERCADEO** *(Sume 35, 36, y 37)* → 552 Q

INSUMOS – CREDITO

39. ¿Qué cantidad de crédito utilizó en 1973 para este cultivo, obtenido de –

a. BANDESA . . . . . 553 Q

b. Otro banco? *(Nombre del banco)* _____ 554 Q

c. Cooperativas? . . . . . 555 Q

d. Compradores o vendedores de sus productos? . . . . . 556 Q

e. Amigos y familiares? . . . . . 557 Q

f. Otros? *(Especifique)* _____ 558 Q

g. **TOTAL** → 559 Q

ASISTENCIA TECNICA

40. ¿Recibió usted en 1973 cualquier consejo técnico sobre cómo producir este cultivo de parte del Servicio de Extensión del Gobierno, una universidad, compañía privada u otro grupo especial? 560

1 Sí – *Siga a 41*

2 No – *Pase al próximo cultivo*

41. ¿Qué clase de consejo técnico?

a. Demostraciones . . . . . 561 Número

b. Clases . . . . . 562 Número

c. Visitos . . . . . 563 Número

SECCION IV - COSTOS DE PRODUCCION - Continuación

ANOTACIONES

SECCION V – INVENTARIO DE ANIMALES

Ahora, desearíamos preguntarle acerca de todo su ganado. Por favor esté seguro que incluya cualquier que no esté en su terreno pero pertenezca a usted. Excluya cualquier que esté en su finca pero no pertenezca a usted.		Ninguno
42. ¿Cuántas cabezas de ganado de todas las edades y de todos los tipos pertenecen a usted ahora? Incluya terneros que todavía maman.	564	☐ *Pase a 47*
GANADO LECHERO 43. ¿Cuántas de estas (número en 42) cabezas son ganado lechero?	565	☐ *Pase a 45*
44. ¿Cuántas de estas (número en 43) cabezas de ganado lechero son		
a. Vacas que parieron en 1973 o años anteriores?	566	☐
b. Vaquillas y terneras destetadas?	567	☐
c. Terneros y terneras (no destetados)?	568	☐
d. Toros y toretes que ya fueron destetados?	569	☐
e. **TOTAL** *(Suma de 44a – 44d inclusive – deberá ser igual al total en 43)* ⟶	570	☐
GANADO DE CARNE 45. ¿Cuántas cabezas de gando de carne de todas las edades pertenecen a usted ahora?	571	☐ *Pase a 47*
46. De estas (número en 45) cabezas de ganado de carne, ¿cuántas son –		
a. Vacas que parieron en 1973 o años anteriores?	572	☐
b. Vaquillas y terneras destetadas?	573	☐
c. Terneros y terneras (no destetados)?	574	☐
d. Toros y toretes que ya fueron destetados?	575	☐
e. Novillos?	576	☐
f. Bueyes de trabajo?	577	☐
g. **TOTAL** *(Suma de 46a–46f – deberá ser igual al total en 45)* ⟶	578	☐

COMPRAS, NACIMIENTOS, MUERTES Y VENTAS DE GANADO

47a. ¿Ha comprado usted ganado desde el 1ro de enero de 1973?

☐ Sí – *Siga a 47b* ☐ No – *Pase a 48a*

	Número	Valor total	
b. ¿Cuánto fue ganado lechero?	579	580 Q	☐
c. ¿Cuánto fue ganado de carne?	581	582 Q	☐
48a. Desde el 1ro de enero de 1973, ¿cuántos terneros y terneras nacieron, no incluyendo terneros y terneras nacidos muertos? . .	583		☐
b. ¿Cuántos fueron ganado lechero?	584		☐
c. ¿Cuántos fueron ganado de carne?	585		☐

SECCION V – INVENTARIO DE ANIMALES – Continuación

49a. ¿Cuántas cabezas de ganado de todas clases incluyendo terneros y terneras han muerto desde el 1ro de enero de 1973?	586	Ninguno ☐
b. ¿Cuántas de estas cabezas fueron ganado –		
(1) Lechero?	587	☐
(2) De carne?	588	☐
c. ¿Cuántas cabezas le han robado o se le han perdido desde el 1ro de enero de 1973?	589	☐
d. ¿Cuántas de estas cabezas fueron ganado –		
(1) Lechero?	590	☐
(2) De corne?	591	☐
e. ¿Cuántas cabezas fueron destazadas para el consumo de su familia, amigos o parientes?	592	☐
f. ¿Cuántas se vendieron destazadas en su terreno?	593 Número / 594 Valor total Q	☐
g. **NUMERO TOTAL DE GANADO MUERTO, PERDIDO Y DESTAZADO** *(Sume 49a, c, e y f)* →	595	☐

	Número	Valor total	
50a. Desde el 1ro de enero de 1973, ¿cuánto ganado lechero y de carne de todas las edades fue vendido?	596	597 Q	☐ Pase a 51
b. ¿Cuánto fue vendido para ser destazado?	598	599 Q	☐
c. ¿Cuánto fue vendido para engorde?	600	601 Q	☐
d. ¿Cuánto fue vendido como semental, o para cualquier otro propósito que no fuese el destace o engorde?	602	603 Q	☐
e. ¿Cuánto de este ganado fue ganado –			
(1) Lechero?	604	605 Q	☐
(2) De carne?	606	607 Q	☐

PRODUCTOS LECHEROS

51a. ¿Se ordeñaron vacas en este terreno desde el 1ro de enero de 1973?	608 1 ☐ Sí – *Siga a 51b* 2 ☐ No – *Pase a 52*	
b. ¿Cuántas se ordeñaron ayer?	609	☐
c. ¿Cuánta leche se produjo –		
(1) Ayer? _____ Cantidad _____ Unidad de medida	PARA USO DE LA OFICINA: 610 Cantidad / 611 Código	☐
(2) En 1973? _____ Cantidad _____ Unidad de medida	612 Cantidad / 613 Código	☐
d. ¿Cuánto (unidad en c(2)) de leche se vendió en 1973?	614	☐
e. ¿Cuál fue el valor total de leche vendido en 1973?	615 Q	

SECCION V – INVENTARIO DE ANIMALES – Continuación

OTROS ANIMALES

52. ¿Cuántos marranos pertenecen a usted ahora?	616			Ninguno ☐ Pase a 54
53. ¿Cuántos marranos –	617 Número	618 Valor total Q		
a. Se compraron en 1973?				☐
b. Nacieron en 1973?	619			☐
c. Murieron o fueron perdidos o robados en 1973?	620			☐
d. Se vendieron en 1973?	621 Número	622 Valor total Q		☐
e. Fueron destazados en 1973? (1) Para consumo?	623			☐
(2) Para vender?	624 Número	625 Valor total Q		☐
54. ¿Cuántos pollos, gallinas, patos y pavos pertenecen a usted ahora?	626			☐ Pase a 57
55. ¿Cuántos pollos, gallinas, patos y pavos –	627 Número	628 Valor total Q		
a. Se compraron en 1973?				☐
b. Nacieron en 1973?	629			☐
c. Murieron o fueron perdidos o robados en 1973?	630			☐
d. Se vendieron en 1973?	631 Número	632 Valor total Q		☐
e. Fueron destazados en 1973? (1) Para consumo?	633			☐
(2) Para vender?	634 Número	635 Valor total Q		☐
56a. ¿Cuántos huevos se produjeron ayer?	636 Docenas			☐
b. ¿Cuál fue la cantidad y el valor total de los huevos que vendió en 1973?	637 Docenas	638 Q		☐

SECCION V – INVENTARIO DE ANIMALES – Continuación

ANIMAL 2

ESPECIE DE ANIMAL **2**

PARA USO DE LA OFICINA 684 | Nada ☐

INSUMOS

61. Para sus (especie de animal), ¿cuánto gastó desde el 1ro de enero de 1973 para –

a. Alimentos, incluyendo sal?	685 Q	☐
b. Drogas, medicinas y químicos?	686 Q	☐
c. Transporte de materiales a la finca y transporte de (especie de animal, incluyendo leche o huevos si es aplicable) al mercado –		
(1) Por vehículo de motor?	687 Q	☐
(2) Por animal?	688 Q	☐
d. Comisiones sobre ventas?	689 Q	☐
e. Reparaciones a los edificios, cercas, etc., para (especie de animal)?	690 Q	☐
f. Servicios veterinarios?	691 Q	☐
g. Otros gastos, etc., para (especie de animal)?	692 Q	☐
h. **TOTAL** →	693 Q	☐

ENTREVISTADOR > Use la misma unidad de medida en pregunta 62 que se usó en la Seccion II, pregunta 6.

62. ¿Cuánta superficie de pasto fue utilizada para (especie de animal)?	694	☐
63a. ¿Cuántos jornales pagados se utilizaron para sus (especie de animal) en 1973?	695	☐
b. ¿Cuánto se les pagó a los trabajadores por día?	696 Q	☐
c. ¿Fue el jornal con o sin comida?	697 1 Con 2 Sin	
d. ¿Cuántos jornales no pagados, incluyendo a usted mismo y miembros de su familia, se utilizaron para sus (especie de animal) en 1973?	698	☐
64a. ¿Recibió usted cualquier consejo técnico sobre (especie de animal) de parte del Servicio de Extensión del Gobierno, una universidad, compañía privada u otro grupo especial?	699 1 Sí – *Siga a 64b* 2 No – *Pase a 65*	
b. ¿Qué clase de consejo técnico?		
(1) Demostraciones	700 Número	☐
(2) Clases	701 Número	☐
(3) Visitas	702 Número	☐
65. ¿Qué cantidad de crédito utilizó en 1973 para sus (especie de animal), obtenido de –		
a. BANDESA?	703 Q	☐
b. Otras fuentes? *(Especifique)* →	PARA USO DE LA OFICINA	
(1) _____ Fuente _____ Valor	704 Código 705 Q	☐
(2) _____ Fuente _____ Valor	706 Código 707 Q	☐

SECCION V – INVENTARIO DE ANIMALES – Continuación

ANIMAL 3

ESPECIE DE ANIMAL **3**

PARA USO DE LA OFICINA 708 | Nada ☐

INSUMOS

61. Para sus (especie de animal), ¿cuánto gastó desde el 1ro de enero de 1973 para –

	PARA USO DE LA OFICINA	Nada
a. Alimentos, incluyendo sal?	709 Q	☐
b. Drogas, medicinas y químicos?	710 Q	☐
c. Transporte de materiales a la finca y transporte de (especie de animal, incluyendo leche o huevos si es aplicable) al mercado –		
(1) Por vehículo de motor?	711 Q	☐
(2) Por animal?	712 Q	☐
d. Comisiones sobre ventas?	713 Q	☐
e. Reparaciones a los edificios, cercas, etc., para (especie de animal)?	714 Q	☐
f. Servicios veterinarios?	715 Q	☐
g. Otros gastos, etc., para (especie de animal)?	716 Q	☐
h. TOTAL →	717 Q	☐

ENTREVISTADOR > Use la misma unidad de medida en pregunta 62 que se usó en la Seccion II, pregunta 6.

62. ¿Cuánta superficie de pasto fue utilizada para (especie de animal)?	718	☐
63a. ¿Cuántos jornales pagados se utilizaron para sus (especie de animal) en 1973?	719	☐
b. ¿Cuánto se les pagó a los trabajadores por día?	720 Q	☐
c. ¿Fue el jornal con o sin comida?	721 1 ☐ Con 2 ☐ Sin	
d. ¿Cuántos jornales no pagados, incluyendo a usted mismo y miembros de su familia, se utilizaron para sus (especie de animal) en 1973?	722	☐
64a. ¿Recibió usted cualquier consejo técnico sobre (especie de animal) de parte del Servicio de Extensión del Gobierno, una universidad, compañía privada u otro grupo especial?	723 1 ☐ Sí – *Siga a 64b* 2 ☐ No – *Pase a 65*	
b. ¿Qué clase de consejo técnico?		
(1) Demostraciones	724 Número	☐
(2) Clases	725 Número	☐
(3) Visitas	726 Número	☐
65. ¿Qué cantidad de crédito utilizó en 1973 para sus (especie de animal), obtenido de –		
a. BANDESA?	727 Q	☐
b. Otras fuentes? (*Especifique*)	PARA USO DE LA OFICINA	
(1) _____ Fuente _____ Valor	728 Código / 729 Q	☐
(2) _____ Fuente _____ Valor	730 Código / 731 Q	☐

SECCION V – INVENTARIO DE ANIMALES – Continuación

ANOTACIONES

SECCION VI – PRODUCTOS ELABORADOS

PRODUCTOS

66. ¿Qué productos agropecuarios se elaboraron dentro de la finca en el ultimo año tales como panels, destace, trilla, cuero, mar,tequilla o crema, queso, lana, café,etc.?

732

1 [ ] Ningunc – *Pase a 68*
2 [ ] Panela
3 [ ] Trilla
4 [ ] Destace
5 [ ] Cuero
6 [ ] Mantequilla
7 [ ] Queso
8 [ ] Lana
9 [ ] Café
0 [ ] Otros productos

ENTREVISTADOR > Transfiera cada nombre de producto de pregunta 66 a una de las preguntas 67a, b y c antes de continuar la entrevista. Haga las preguntas sobre "Ventas e Insumos" para cada producto.

VENTAS E INSUMOS

67a. Nombre del producto elaborado

1 _____

	PARA USO DE LA OFICINA	Ninguna
	733	
(1) Cuál fue la cantidad total del producto elaborado en 1973? _____ Cantidad _____ Unidad de medida	734 Cantidad / 735 Unidad	☐
(2) ¿Cual fue la cantidad del producto elaborado en 1973 que fue vendido? (Use la misma unidad que se usó en (1))	736	☐
(3) ¿Cuál fue el valor total del producto elaborado en 1973 que fue vendido?	737 Q	☐
(4) ¿Cuántos jornales pagados fueron utilizados en la elaboración de este producto?	738	☐
(a) ¿Cuánto se les pagó a los trabajadores por día?	739 Q	☐
(5) ¿Cuántos jornales no pagados, incluyendo a usted mismo y otros miembros de su familia, fueron utilizados en la elaboración de este producto?	740	☐
(6) ¿En cuánto calcularía el valor de los seguientes gastos en la elaboración de este producto?	741	☐
(a) Materiales, excluyendo materiales de empaque	Q	
(b) Químicos de cualquier tipo	742 Q	☐
(c) Uso de maquinaria	743 Q	☐
(d) Empaque	744 Q	☐
(e) Transporte	745 Q	☐
(f) Otros gastos, tales como commisiones sobre ventas, etc.	746 Q	☐
(g) **TOTAL** (*Sume a, b, c, d, e y f*) ⟶	747 Q	☐
(7) ¿Recibió usted algún consejo técnico en la elaboración de este producto en 1973?	748 1 Sí 2 No	☐
(8) ¿Cuál fue la cantidad del crédito que usted utilizó este año en la elaboración de este producto, obtenido de –	749	☐
(a) BANDESA	Q	
(b) Otras fuentes →		
(1) _____ Fuente _____ Valor	PARA USO DE LA OFICINA: 750 Código / 751 Q	☐
(2) _____ Fuente _____ Valor	752 Código / 753 Q	☐

PRODUCTOS ELABORADOS 1

SECCION VI – PRODUCTOS ELABORADOS – Continuacion

VENTAS E INSUMOS

67b. Nombre del producto elaborado

2

PARA USO DE LA OFICINA

254 | 255 Cantidad | 256 Unidad | Ninguna

(1) Cuál fue la cantidad total del producto elaborado en 1973? | | |

Cantidad | Unidad de medida

(2) ¿Cual fue la cantidad del producto elaborado en 1973 que fue vendido? (Use la misma unidad que se usó en (1)) | 257 | |

(3) ¿Cuál fue el valor total del producto elaborado en 1973 que fue vendido? . . . . . | 258 Q | |

(4) ¿Cuántos jornales pagados fueron utilizados en la elaboración de este producto? . . . . . | 259 | |

(a) ¿Cuánto se les pagó a los trabajadores por día? . . . . . | 260 Q | |

(5) ¿Cuántos jornales no pagados, incluyendo a usted mismo y otros miembros de su familia, fueron utilizados en la elaboración de este producto? . . . . . | 261 | |

(6) ¿En cuánto calcularía el valor de los seguientes gastos en la elaboración de este producto? . . . . . | 262 | |

(a) Materiales, excluyendo materiales de empaque . . . . . | Q | |

(b) Químicos de cualquier tipo . . . . . | 263 Q | |

(c) Uso de maquinaria . . . . . | 264 Q | |

(d) Empaque . . . . . | 265 Q | |

(e) Transporte . . . . . | 266 Q | |

(f) Otros gastos, tales como commisiones sobre ventas, etc. | 267 Q | |

(g) **TOTAL** *(Sume a, b, c, d, e y f)* ⟶ | 268 Q | |

(7) ¿Recibió usted algún consejo técnico en la elaboración de este producto en 1973? . . . . . | 269 1 Sí 2 No | |

(8) ¿Cuál fue la cantidad del crédito que usted utilizó este año en la elaboración de este producto, obtenido de – | 270 | |

(a) BANDESA . . . . . | Q | |

(b) Otras fuentes → 7

PARA USO DE LA OFICINA

(1) _____ | 771 Código | 772 Q | |

Fuente | Valor

(2) _____ | 773 Código | 774 Q | |

Fuente | Valor

ANOTACIONES

PRODUCTOS ELABORADOS 2

SECCION VI – PRODUCTOS ELABORADOS – Continuacion

VENTAS E INSUMOS

67c. Nombre del producto elaborado

3

	PARA USO DE LA OFICINA	Ninguna
	775	

(1) Cuál fue la cantidad total del producto elaborado en 1973?

Cantidad _____ Unidad de medida

776 Cantidad	777 Unidad	
		☐

(2) ¿Cual fue la cantidad del producto elaborado en 1973 que fue vendido? (Use la misma unidad que se usó en (1)) — 778 ☐

(3) ¿Cuál fue el valor total del producto elaborado en 1973 que fue vendido? . . . . . — 779 Q ☐

(4) ¿Cuántos jornales pagados fueron utilizados en la elaboración de este producto? . . . . . — 780 ☐

(a) ¿Cuánto se les pagó a los trabajadores por día? . . . . . — 781 Q ☐

(5) ¿Cuántos jornales no pagados, incluyendo a usted mismo y otros miembros de su familia, fueron utilizados en la elaboración de este producto? . . . . . — 782 ☐

(6) ¿En cuánto calcularía el valor de los seguientes gastos en la elaboración de este producto? . . . . . — 783 ☐

(a) Materiales, excluyendo materiales de empaque . . . . . — Q

(b) Químicos de cualquier tipo . . . . . — 784 Q ☐

(c) Uso de maquinaria . . . . . — 785 Q ☐

(d) Empaque . . . . . — 786 Q ☐

(e) Transporte . . . . . — 787 Q ☐

(f) Otros gastos, tales como commisiones sobre ventas, etc. — 788 Q ☐

(g) TOTAL (*Sume a, b, c, d, e y f*) ⟶ — 789 Q ☐

(7) ¿Recibió usted algún consejo técnico en la elaboración de este producto en 1973? . . . . . — 790 1 Sí 2 No ☐

(8) ¿Cuál fue la cantidad del crédito que usted utilizó este año en la elaboración de este producto, obtenido de –

(a) BANDESA . . . . . — 791 Q ☐

(b) Otras fuentes

PARA USO DE LA OFICINA			
792	Código	793 Q	☐
794	Código	795 Q	☐

(1) _____ Fuente _____ Valor

(2) _____ Fuente _____ Valor

ANOTACIONES

PRODUCTOS ELABORADOS 3

SECCION VII – HABER NETO Y ADMINISTRACION

ENTREVISTADOR > En las preguntas 68 a 71, se refiere sólo al terreno identificado en la Sección II.

BIENES

68. ¿En cuánto calcularía usted el total del valor comercial de todo el terreno que usted utiliza, incluyendo el valor de casas, edificios no residenciales y mejoras al terreno tales como cercas, pozos, etc.? Excluya el valor de cualesquiera parcelas y edificios que pertenezcan a usted pero se utilicen por otros ahora. — 796 Q

69. En cuánto calcularía el valor total de las casas, establos y otros edificios localizados en el terreno que usted utiliza? — 797 Q

70. ¿En cuánto calcularía el valor total de las herramientas de mano, que están ahora en el terreno utilizado por usted tales como azadones, palas, hachas, rastrillos, y cualesquiera otras herramientas de esta clase? — 798 Q

71a. ¿Tiene usted máquinas o implementos tales como tractores, segadoras, arados, trilladoras, vagones, motores eléctricos o de gasolina, camiones de motor, bombas etc., en el terreno que utiliza? — 799 · Sí — Siga a 71b · No — Pase a 72a

b. ¿Cuáles son estas maquinas e implementos?

PARA USO DE LA OFICINA	Descripción de cada máquina e implemento	Año en que se compró nuevo	Costo cuando se compró nuevo	Valor actual estimado
800		801	802 Q	803 Q
804		805	806 Q	807 Q
808		809	810 Q	811 Q
812		813	814 Q	815 Q
816		817	818 Q	819 Q

72a. ¿Cuántos jornales pagados se utilizaron en 1973 en la construcción, mantenimiento, reparación o mejoramiento de casas, otos edificios, sistemas de irrigación o drenaje, cercas, máquinas, etc.? . . . . . — 820 Q

b. ¿Cuánto se les pagó a los trabajadores por día? . . . . . — 821 Q

73. ¿Cuántos jornales no pagados, incluyendo a usted mismo, otros miembros de su familia y otras personas, se utilizaron en 1973 en la construcción, mantenimiento, reparación o mejoramiento de casas, otros edificios, sistemas de irrigación o drenaje, cercas, máquinas, etc.? — 822 Q

74. ¿Cuál fue el costo total de los materiales utilizados en 1973 en la construcción, mantenimiento, reparación o mejoramiento de casas, otros edificios, sistemas de irrigación o drenaje, cercas, máquinas, etc.? — 823 Q

75a. ¿Cuántos jornales pagados se utilizaron en su(s) huerto(s) durante 1973? . . . . . — 824 Q

b. ¿Cuántos jornales no pagados? . . . . . — 825 Q

SECCION VII – HABER NETO Y ADMINISTRACION – Continuación

ENTREVISTADOR > En pregunta 76, incluya los créditos anotados en este cuestionario antes.

CREDITO

826

76a. ¿Utilizó usted fuentes de crédito en 1973, incluyendo préstamos de bancos, cooperativas, compradores, vendedores, amigos, parientes u otros?

1 Sí – *Siga a 76b*
2 No – *Pase a 77*

b. ¿Cuáles fuentes de credito utilizó?

PARA USO DE LA OFICINA	Fuente	Cantidad	Uso principal del credito	PARA USO DE LA OFICINA	Años como usuario	Plazo meses	Tasa de interés anual	Cantidad pendiente
827		828 Q		829	830	831	832	833 Q
834		835 Q		836	837	838	839	840 Q
841		842 Q		843	844	845	846	847 Q
848		849 Q		850	851	852	853	854 Q
855		856 Q		857	858	859	860	861 Q

77a. ¿Estima usted que podría utilizar (más) crédito a intereses corrientes y ser capaz de pagar la deuda y el interés? 862

1 Sí – *Siga a 77b*
No – *Pase a 78*

b. ¿Para qué y cuánto usaría?

Uso	Cantidad
	Q
	Q
	Q
	Q

PARA USO DE LA OFICINA

863	Codigo	864	Q
865	Codigo	866	Q
867	Codigo	868	Q
869	Codigo	870	Q

78a. ¿Es usted miembro de alguna cooperativa? 871

1 Sí – *Haga las preguntas 78b y c*
2 No – *Pase a 78d y omita 78b y c*

b. ¿Cuál es el nombre de la cooperativa? _____ Nombre

c. ¿Cuál es el propósito de la cooperativa? _____ Propósito

PARA USO DE LA OFICINA

872 Codigo

873 Codigo

d. ¿Le gustaría ser un miembro? 874

1 Sí
2 No

SECCION VII – HABER NETO Y ADMINISTRACION – Continuación

ENTREVISTADOR > Si el productor recibió un salario para sus servicios administrativos en 1973 y fue incluido en pregunta 79, omita 80a, pasando a 80b.

79a. ¿Cuánto se gastó en total en 1973 para los servicios de personas contratados, tales como administradores, tenedores de libros, contadores, etc., que fueron responsables por la operación diaria o contribuyeron a las operaciones generales del terreno?. . . . . 875 Q

b. ¿Cuánto fue el salario mensual promedio de estas personas?. . . . . 876 Q

80. ¿Cuántos meses se gastaron en 1973 en la administración del terreno por –

a. Usted mismo? 877

b. Otras personas no pagadas, incluyendo a miembros de su familia, amigos, etc.? 878

81a. ¿Tuvo usted algun otro gasto en la operación general del terreno en 1973, tales como arrendamiento, seguros, impuestos, compras de combustibles, etc.?. 879

1 Sí – Siga a 81b
2 No – Pase a 82

b. Especifique estos gastos

Tipo de gasto	Monto

PARA USO DE LA OFICINA

880	Código	881 Q
882	Código	883 Q
884	Código	885 Q
886	Código	887 Q

ANOTACIONES

SECCION VIII – INGRESOS Y CONSUMO DE LA FAMILIA

ENTREVISTADOR > Esté seguro que se incluyan en pregunta 82 todos los ingresos de la familia, incluyendo los ingresos anotados en este cuestionario antes.

		Nada
INGRESOS		
82. ¿Cuánto recibieron usted y otros miembros de su familia durante 1973 por –	888	☐
a. Venta de cultivos?	Q	
b. Venta de animales ?	889 Q	☐
c. Venta de productos elaborados?	890 Q	☐
d. Trabajo de carácter administrativo?	891 Q	☐
e. Jornales en otros terrenos?	892 Q	☐
f. Trabajo no agrícola en su terreno, tal como artesanías, etc.?	893 Q	☐
g. Trabajo de carácter administrativo o técnico en la ciudad, en una fábrica, o cualquier otro trabajo administrativo o técnico no agrícola fuera de su terreno?	894 Q	☐
h. Otro trabajo en la ciudad, en una fábrica, o cualquier otro trabajo no administrativo, técnico ni agrícola fuera de su terreno?	895 Q	☐
i. Alquiler?	896 Q	☐
j. Intereses, dividendos, etc.?	897 Q	☐
k. Otras fuentes de ingreso?	898 Q	☐
l. TOTAL →	899 Q	☐
CONSUMO		
83. ¿Cuánto gastaron usted y otros miembros de su familia durante 1973 para –	900	☐
a. Alimentos y bebidas alcohólicas?	Q	
b. Ropa?	901 Q	☐
c. Artículos personales?	902 Q	☐
d. Artículos para el hogar?	903 Q	☐
e. Agua, luz, telefono, etc.?	904 Q	☐
f. Servicios médicos y dentales?	905 Q	☐
g. Educación?	906 Q	☐
h. Transporte de la familia, recreación, etc.?	907 Q	☐
i. Otros?	908 Q	☐
j. TOTAL →	909 Q	☐

SECCION IX – SECCION ESPECIAL SOBRE ASISTENCIA TECNICA

ENTREVISTADOR > Recibió el productor consejo técnico durante el ultimo año? (Ver pregunta 40 para cada cultivo.)

☐ Sí – *Continúe la entrevista* ☐ No – *Pase a la Sección X*

84. Favor indique de nuevo los cultivos en los cuales recibió consejo técnico.

PARA USO DE LA OFICINA
910
911
912
913
914

ENTREVISTADOR > Repita la pregunta 85a para cada cultivo. Escribe los numeros de los cultivos de Sección IV, pregunta 13a, en las células appropriadas abajo.

85a. ¿De parte de quien y en que estapa del cultivo mencionado en 80 recibió usted consejo técnico?	Preparación de tierra	Siembra	Labores cultu rales	Fertiliza-ción	Control de enfer-midades y plagas	Cosecha	Venta
(1) Promotor agrícola	915	916	917	918	919	920	921
(2) Promotor de extensión	922	923	924	925	926	927	928
(3) Servicios de extensión de la universidad	929	930	931	932	933	934	935
(4) Alguna compañia privada	936	937	938	939	940	941	942
(5) INDECA	943	944	945	946	947	948	949
(6) Otro – Especifique _____	950	951	952	953	954	955	956

b. El consejo técnico fue através de –

957
1 Folletos
2 Instrucciones verbales
3 Instrucciones por escrito
4 Otro

c. Considera usted que el consejo técnico fue –

958
1 Muy bueno
2 Bueno
3 Regular
4 Sin uso

SECCION X – PARA USO DEL ENTREVISTADOR

Cuantas visitas fueron necessarios para completar esta entrevista

Fecha de la entrevista	Firma del entrevistador	Firma del productor