



**DEPARTMENT OF AGRICULTURAL ECONOMICS & RURAL SOCIOLOGY**  
**The Ohio State University**  
**2120 Fyffe Road**  
**Columbus, Ohio 43210**

SEMI-ANNUAL REPORT FOR  
RESEARCH PROJECT

ANALYSIS OF CAPITAL FORMATION  
AND TECHNOLOGICAL INNOVATION  
AT THE FARM LEVEL IN LDC's

by

Norman Rask  
Richard L. Meyer

January, 1972

Under Research Contract AID/csd-2501

between

The United States Agency for International Development

and

The Research Foundation  
The Ohio State University  
Columbus, Ohio

Department of Agricultural Economics and Rural Sociology  
The Ohio State University  
2120 Fyffe Road  
Columbus, Ohio 43210

## TABLE OF CONTENTS

	<u>Page</u>
FOREWORD . . . . .	i
<u>PART I</u>	
FIELDWORK IN BRAZIL . . . . .	1
Data Collection . . . . .	1
Rio Grande do Sul . . . . .	1
Santa Catarina . . . . .	2
Sao Paulo . . . . .	3
Minas Gerais . . . . .	4
Other In-Country Activities . . . . .	5
Reporting Research Results . . . . .	5
Further Research in Brazil . . . . .	8
Summary and Future Plans . . . . .	10
Personnel Assignments . . . . .	11
INSTITUTIONAL LINKAGES AND USE OF DATA . . . . .	13
<u>PART II</u>	
ON-CAMPUS ACTIVITIES . . . . .	14
A Research Program in India . . . . .	14
Reports on Completed Research Projects . . . . .	16
Progress Reports on Continuing Research Projects . . . . .	25
PUBLICATIONS . . . . .	54
PERSONNEL ACTIVELY PARTICIPATING IN THE PROJECT . . . . .	58

## FOREWORD

The Department of Agricultural Economics and Rural Sociology of The Ohio State University entered into subject contract on July 1, 1969, to analyze the interrelationship at the farm level between capital formation, technological change, and growth of agricultural output in selected developing countries. The project is designed for a period of five years. The present report covers project activities under this contract for the period July 1, 1971 to January 1, 1972.

The project has two primary objectives: (1) investigate and describe capital formation and utilization at the farm level, including the impact of technological change on farm capital requirements and the capital formation process, and (2) evaluate the implications and impact of selected agricultural policies designed to stimulate capital formation.

New field work has been undertaken in Brazil with early emphasis on the key areas of technology (fertilizer and mechanization), agricultural credit and pricing policy. Work is now being initiated in the areas of agricultural infrastructure (input firms), sociological aspects of technological change, and the dynamics of capital formation and growth in the agricultural sector.

Operationally, work under the project has proceeded in several stages. The great heterogeneity among farms in developing agriculture, especially apparent in the Brazil experience, led to the need for a strong and wide spread data base from which to investigate the many aspects related to agricultural policy and capital formation. Substantial differences among farms in size of operation, use of technology, tenure,

enterprise combinations and resource endowment, dictate different growth paths. The first two years, therefore, were largely devoted to the design and buildup of a farm level data base representative of major types of farming regions and development processes in Southern Brazil. Over 1700 intensive farm level interviews in a four state area have been undertaken during this period and together with 954 interviews from previous studies (1965) form the initial data base for the project. Additional data gathering has been conducted with input firms (258) and field research is currently underway to study sociological aspects of technological change. Field research activities are carried out jointly with local universities and research institutes.

The second stage involves a series of analytical studies, undertaken concurrently with the establishment of the research data base. These studies have initially focused on agricultural credit, fertilizer, mechanization and the capital formation process.

The third stage of work, includes the development of aggregate or sector analysis. The design and buildup of a representative data base and specific analytical studies serve as the foundations for understanding the basic resource situations and development processes in a region. The sector model analysis allows a more explicit consideration of the potential impact of policy alternatives on capital formation and growth. A model has been developed for the wheat and cattle region of Southern Brazil.

Future plans include (1) an expansion of the data base to other areas of Brazil, (2) continued analysis of existing data, (3) further development of the sector model, (4) extension of research results to

serve as an input to decision making, and (5) continued maintainance of the data base.

Project activities were initiated in Brazil in November of 1969 in cooperation with the USAID Mission to Brazil, the Central Bank of Brazil, and two Brazilian universities. An initial field research effort was completed in January and February of 1970. Additional research in cooperation with two other Brazilian universities was completed in July of 1970 and July 1971. Supplementary rural infrastructure studies were undertaken early in 1971. The first fieldwork on sociological variables was initiated in November 1971.

The four universities are: the Federal University of Rio Grande do Sul, in Porto Alegre in the state of Rio Grande do Sul; the Federal University of Santa Catarina, in Florianopolis in the state of Santa Catarina; the University of Sao Paulo, at Piracicaba in the state of Sao Paulo; and the Federal University of Vicosa, at Vicosa in the state of Minas Gerais. Discussions are underway which could lead to additional farm surveys in other parts of Brazil and with other institutions.

Several individual studies using the data have been completed, and others are in various stages of analysis. Progress statements on each are included as part of this report. A publication series entitled "Research Notes" was initiated last year. Since July 1, four research notes were written making a total of twelve published in the series. A list of titles is included with this report and copies are available upon request. Those notes especially relevant in Brazil are translated into Portuguese and over 400 copies of each are distributed to leading public and private institutions.

Discussions have been held with members of the USAID Mission in Brazil regarding additional means of bringing research results to the attention of local decision-makers. One opportunity presented itself in conjunction with planning for PROTERRA, a Brazilian program of agrarian reform. Preparations are now underway with the Ministry of Agriculture to hold a seminar in which project results would be presented and discussed with representatives of Brazilian institutions and the USAID Mission.

## FIELD WORK IN BRAZIL

The contract conducted field interviewing in four southern and central states of Brazil during the period January 1, 1970 to January 1, 1972. A brief description of this effort follows.

### Data Collection

#### Rio Grande do Sul

Field interviewing in the state of Rio Grande do Sul in conjunction with the Federal University of Rio Grande do Sul has been carried out in two steps. In January and February of 1970, a total of 370 farm-level interviews were conducted in the three counties of Lajeado, Carazinho, and Nao-Me-Toque. Two of the areas, Carazinho and Lajeado, had been interviewed previously in 1965. Many of the farmers interviewed in 1965 were re-interviewed in 1970. The data from the 370 farms has been used in various studies already completed and others currently underway. A preliminary report of over 100 pages was prepared in Portuguese and distributed in December of 1970.

In July, 1970, 171 farmers were interviewed in the municipio of Sao Borja located on the western border of the state adjacent to Argentina. This municipio has been profoundly influenced by governmental policies which have rapidly stimulated wheat and soybean production. The objective for the interviewing was to obtain data on the transformations occurring at the farm level because of the shift from traditional cattle raising to mechanized, highly capital extensive wheat growing.

Descriptive reports of this field work have been prepared in Portuguese and distributed to Brazilian institutions. Individual studies using the data have been completed at OSU and the Federal University, and others are in various stages of analysis.



During February, 1971, a second stage of data collection was undertaken in these same municipios. This stage had the principal objective of identifying the extent to which increased wheat production had stimulated transformations in input and product markets in rural communities. Fifty-five interviews were conducted with agronomists, bankers, mayors, and input and product dealers and a research note was written based on the results.

Through these interviews at both the farm and rural community level, some preliminary conclusions have been obtained indicating the extent to which Brazilian policies have stimulated wheat production with concomittant effects on the non-farm economy. Some important limitations and resulting problems have also been identified.

A further extension of research on wheat was undertaken in December, 1971 with the interviewing of key geneticists and other scientists doing agronomic experimentation in Rio Grande do Sul to improve wheat productivity. The objectives are to identify key factors limiting productivity increases, and anticipate possible economic returns from research leading to improved varieties and growing technology. Productivity increases appear essential if present price supports are reduced.

### Santa Catarina

Field interviewing in the state of Santa Catarina was conducted in January and February of 1970. A total of 370 farm-level interviews were obtained in three municipios. Again, as in Rio Grande do Sul, farmers in the two municipios of Concordia and Timbo had been interviewed in 1965 and were reinterviewed in 1970. In the third municipio, Turvo, interviews were conducted for the first time. Turvo is charac-

terized by rice and corn production and has recently undergone a shift to mechanization on many farms in the area. Some aspects of the analysis are completed and reported in individual studies.

### Sao Paulo

. Farm interviews have been undertaken in Sao Paulo in conjunction with the Department of Applied Social Sciences, Agricultural School "Luiz de Queiroz", University of Sao Paulo on three separate occasions. In July, 1970 interviews were conducted on 383 farms in ten municipios in the Ribeirao Preto area located in the northern part of the state. This is an important agricultural region producing coffee, sugar-cane, annual crops, dairy and beef cattle. The municipios were selected on the basis of concentration in the production of these commodities. Farmers specializing in these commodities were randomly selected for interviewing.

A second stage of data collection was undertaken in this same region in December 1970. Over 60 interviews were conducted with mayors, agronomists, statistical agents and fertilizer dealers to obtain general background information about the region, and data on fertilizer use and distribution.

A third stage of research in Ribeirao Preto involved interviewing 143 marketing firms for a study which will examine the relationship between capital formation on farms, and the development of marketing facilities at the community level. An attempt will be made to test the importance of linkages between producing and marketing sectors, and marketing policies in explaining farm-level capital formation. These data are on cards and tabulation will soon be initiated.

The fourth stage of survey work in the region was initiated in October, 1971. A team of Brazilian and OSU sociologists began reinterviewing the same farmers to obtain data on sociological variables related to capital formation. Other interviews will be conducted with members of the general population and local decision-makers. Of special interest will be sociological factors such as structural differentiation, community solidarity, and power structure. It is expected that this survey will be completed in March, 1972.

Another survey was conducted in a second geographic region of the state in July, 1971. One hundred and fifty farmers were interviewed in the municipios of Itapetininga and Guaira. This region was selected because its backwardness and poverty offer a sharp contrast to Ribeirao Preto, and data were available in ESALQ from interviews on some of the farms in 1965/66, thereby offering an opportunity to study farm-level changes over time. These data are on cards and analysis has begun.

A preliminary report on the Ribeirao Preto survey has been prepared and is being distributed in Brazil. A number of individual studies using the data have been completed at OSU and ESALQ, and others are in various stages of analysis.

#### Minas Gerais

The fourth major focus of field work during 1970 was located in the state of Minas Gerais where 277 farm-level interviews were conducted in collaboration with the Institute of Rural Economics, Federal University of Vicosa. Three general areas were included in this field work: the first was the municipio of Muriae, located in the mountainous eastern region known as Zona da Mata; the second was in Capinopolis, one of the most mechanized regions of the state; the third was Uberaba,

a cattle raising area located almost directly north of the area in Sao Paulo where cattle growers were interviewed. The latter two municipios are in the Minas Triangle, the richest area of the state where topography and farm size facilitate higher levels of mechanization than found elsewhere. The Zona da Mata is one of the old coffee growing areas which has been depressed because of a coffee decline during the last decade. Farms are small and production is largely subsistence. An opportunity may exist for studying farm decapitalization in this region, rather than capital formation.

#### Other In-Country Activities

In the second annual project report covering the period July 1, 1970 to June 30, 1971, the results of a progress report to the USAID Mission in Brazil were given in considerable detail. The main concerns raised at that time involved appropriate means for dissemination of research results, and changes in mission priorities which should be continually studied for their implication on project activities. A number of specific items mentioned at that time have been acted upon, and new developments have been reviewed through correspondence and discussions with mission personnel. Major highlights of this continuing dialogue are reported below.

#### Reporting Research Results

Research Notes were the primary means of distributing research results prior to July 1971. Subsequently, a number of individual studies were completed at OSU and Brazilian universities. Copies of these have been and are being distributed in draft and final form, and a special attempt has been made through letters and discussions to call attention to the Ministry of Agriculture and the USAID Mission those

results which have most important implications for Brazilian agricultural policy.

An excellent opportunity for bringing research to bear on policy making was afforded by the Brazilian government announcement of PROTERRA, a fund created to support agrarian reform in Northeast Brazil. The Ministry of Agriculture was authorized to develop alternatives for major portions of the program, and it requested USAID assistance in planning. Dr. Norman Rask was invited by the mission to go to Brazil as a consultant on agricultural credit and production subsidies as complementary policy instruments to PROTERRA. He was joined in Northeast Brazil by Richard L. Meyer, of the OSU staff in Brazil, and Fernando C. Peres of the Ministry of Agriculture for an on-site evaluation and preparation of recommendations to the mission.

Previous research work in Brazil by the Capital Formation Project provided valuable background information for the PROTERRA evaluation and report. For example, preliminary analysis of farm interviews conducted during the previous year and a half in southern Brazil raised questions about the ability of these same policy instruments to significantly stimulate further development on affected farms. It appeared that a technological barrier was inhibiting intensification in the usage of modern inputs such as fertilizer. Furthermore, in spite of high returns from using such inputs on small farms, the policy instruments appeared to have been selective in favor of medium and large farmers. Credit policies and procedures were identified as possible reasons explaining lack of credit use by small farmers, and therefore limited use of modern inputs.

From these results, it was inferred that such a situation might also exist in the Northeast. This background served as a framework to study the potential value of selected policy instruments in the Northeast agriculture. Although data are extremely scarce and fragmentary, preliminary indications suggested that lack of knowledge about production possibilities and technological alternatives coupled with structural problems would likely reduce the effectiveness of credit and price subsidies in stimulating agricultural growth and modernization. In this regard, the situation of the Northeast as compared to Southern Brazil may be sufficiently disadvantageous to suggest that such policies if applied in the Northeast would have a disproportionately smaller impact than realized in the south.

Based on these conclusions, three general recommendations were made in a report to the Minister of Agriculture, his staff, and the mission:

1. Establish in the Northeast an integrated production technology research program including fundamental research in the areas of soil chemistry and fertility, plant genetics and disease, and soil and water management. In later stages of development, an associated action component might be included to disseminate results and speed adoption of recommended practices.

2. Streamline and simplify the credit system so it can operate more efficiently and judiciously for the general purpose of stimulating and facilitating growth in the agricultural sector.

3. Gradually reduce the sugar subsidy price and production quotas to allow a more rational allocation of production resources. A sector study might prove useful in determining the paths of changes and pro-

blems expected to be encountered as this policy change encourages modifications in enterprise organization.

The paper resulting from this study was translated in draft form and distributed to the Central Bank and Finance Ministry. A later version was distributed as part of the Research Note series. (No. 11)

In addition to these means of distributing results, during the last several months periodic discussions have been held with the mission and Ministry of Agriculture concerning the organization of a seminar for representatives of important Brazilian public and private institutions. Agreement was just obtained that the Ministry would sponsor such a meeting, and a tentative date has been set for the end of February, 1972. The program is designed to present and promote discussion on the implications of project results showing the farm-level impact of Brazilian credit, fertilizer, mechanization and wheat policies.

#### Further Research in Brazil

The Mission has been consistently interested in having the Project conduct farm-level research in Northeast Brazil. This results from the USAID priority toward the region and the lack of good information on which to base USAID and Brazilian policy. In an attempt to respond to this interest, OSU staff visited the region in November, 1970, but as was reported in the second annual report, it was not possible to identify specific development programs which could be studied within the framework of existing project emphasis. A second problem was the lack of a local institution with capacity to assist project staff in conducting a farm level survey.

In July 1971, Richard Meyer went to the Northeast to visit with the staff of the School of Agronomy of the University of Ceara regard-

ing joint sponsorship of a survey. This appeared to be a possibility since the institution was beginning a Master's degree program in agricultural economics. The general conclusion of that staff was that they were not yet in a position to finally react to the initiative, but the possibilities did not appear good because of the large number of commitments already assumed with local institutions such as the Bank of the Northeast. However, the matter was left open, and Meyer offered to return to participate in a research seminar being planned for the students in January or February 1972. The Recife office of the Mission was informed of the situation. To date no response has been received from the university.

During January of 1972 the Mission again brought up the matter suggesting that the Federal University of Pernambuco was about to receive authorization to begin an M.S. program in Economic Development, and might be in a position to assist with a field survey. This possibility can be investigated once authorization for the course is finally received.

As reported in the previous report, the Mission was interested in having project personnel maintain contact with the Ministry of Agriculture and its planning and policy-making section (SUPLAN). The first contact was made by Rask and Meyer in November, 1970 and since then Dale Adams, David Francis, Don Larson, Rask and Meyer have all visited SUPLAN in Brasilia to discuss its research program. All of the project research results have been distributed to SUPLAN, and it was one of the section's staff members that participated in the PROTERRA study mentioned earlier in this report. Several Brazilians who participated in capital formation surveys and used the data for the M.S. theses have been hired to work in SUPLAN.



In December, 1971, Francisco Vera, the head of one of SUPLAN's divisions, visited the Department of Agricultural Economics and Rural Sociology, The Ohio State University, to discuss ways in which the project, or the department through other means, could be of assistance to their research. A major topic of discussion was how OSU with its established performance in conducting farm surveys could assist in continuing to bring farm-level data to bear on decision-making. Another area was staff training in Brazil and the States. It is expected that these discussions will be continued with the Ministry and the Mission in conjunction with participation in the seminar.

#### Summary and Future Plans

The field work conducted by the project in Brazil has resulted in the following primary data:

##### Farm interviews:

Rio Grande do Sul	
Planalto Medio	370
Sao Borja	171
Santa Catarina	370
Sao Paulo	
Ribeirao Preto	383
Itapetininga	150
Minas Gerais	<u>277</u>
	1721

##### Non-farm infrastructure and marketing interviews:

Rio Grande do Sul	55
Sao Paulo	<u>203</u>
	258

The sociological survey currently being conducted in Sao Paulo is planned

for 600 interviews.

Several individual studies using this data have already been completed and others are in various stages of analysis and write-up. Some aspects of the data have been thoroughly analyzed but others have not yet been adequately explored. Therefore, at this stage in the planned duration of the project, it is necessary to carefully evaluate possibilities for additional field work in relation to opportunities to fully utilize the large amount of primary data already in hand. Discussions in Brazil and Ohio during the next few weeks will determine the extent to which additional resources should be assigned to fieldwork versus data analysis.

Unless the February seminar and other discussions reveal a need for research on some new topics, it is expected that the analytical studies conducted by the project will continue to be concentrated in the areas of farm mechanization, and fertilizer and credit use. Special emphasis will continue on the two commodities of cattle and wheat.

These issues continue to be high priority ones in Brazilian policies and programs; therefore the project is working with relevant topics. Agricultural development and growth in northern and northeastern Brazil is affected more by policies stimulating expansion into new geographic regions; investment in basic infrastructure like markets, roads, and irrigation; and structural modifications. These types of changes are not as consistent with the present project orientation.

#### Personnel Assignments

SOLON GUERRERO -- Graduate Associate

Mr. Guerrero arrived in Brazil in September, 1971 to begin a six month study of the sociological aspects of capital formation.

HAGOP KAYAYAN -- Graduate Associate

Mr. Kayayan arrived in Brazil in October, 1971 to cooperate with Mr. Guerrero with special emphasis on ethnic background and its relation to capital formation.

DAVID FRANCIS -- Assistant Professor

Dr. Francis, professor of Development Sociology, spent two months of 1971 in Brazil to assist in the organization and beginning stages of the studies concerned with the sociological aspects of capital formation.

#### INSTITUTIONAL LINKAGES AND USE OF DATA

The research strategy regarding relationships with Brazilian institutions as reported in the second annual report, has continued unchanged during the last six months. All surveys are conducted in conjunction with Brazilians and under the auspices of local institutions. Questionnaires, methodology, and survey designs are all developed with their participation and students are trained to do the interviewing. Copies of questionnaires and data cards are retained by the cooperating institutions.

Brazilian faculty and students are making increasing use of the data in their research. Two M.S. students in Sao Paulo recently completed their theses using data from the Ribeirao Preto survey. Five others are in various stages of data analysis or write up. Four of these seven are being advised by OSU staff members in residence at the institution. A Ph.D. student from Minnesota currently in Brazil collecting data for his thesis may use some of the Ribeirao Preto information. One professor expects to use the Itapetininga data for a credit study. Five M.S. students in Rio Grande do Sul have initiated theses with data collected from one of the surveys conducted in that state. The faculty in Minas Gerais are anticipating that approximately five students in the new M.S. class will use project data. A Purdue Ph.D. student that helped collect the Minas Gerais data is using part of it for his thesis.

The results of this research continue to be distributed in the form of Research Notes and leading educational and research institutions receive copies of these. Preliminary drafts of theses dealing with the economics of fertilizer use were used by members of the Agricultural Economics Institute in Sao Paulo for a meeting held on stimulating fertilizer

use. As mentioned above, the PROTERRA study and seminar planned for February are other means of reporting to Brazilian entities and the mission.

On a number of occasions, project personnel have consulted with various organizations planning surveys and research on issues related to the project. Copies of project questionnaires have been distributed to serve as guides for other research, and suggestions have been made for instruments developed by other persons.

In addition to the PROTERRA study, Richard Meyer was invited by the Mission and the Ministry of Agriculture to attend two discussions on alternative agrarian reform strategies. On another occasion, he was invited to participate in a seminar to discuss research priorities for the Agricultural Economics Institute in Sao Paulo.

#### ON-CAMPUS ACTIVITIES

Project activities in the Department of Agricultural Economics Rural Sociology at The Ohio State University have concentrated on data analysis. Research studies, utilizing the data collected in Brazil during 1970 and 1971 have continued. Several of the early projects have been completed during this reporting period and new projects have been initiated. Plans are being completed for an extension of project activities to include field studies in India during the fourth year of the project. Each of these activities is reported below.

##### A Research Program in India

During the six months' period covered by this report, project personnel have continued to explore the possibility of extending project activities to a second country, India.

A detailed proposal was prepared and has been discussed with AID/Washington personnel (Coutu, Jensen, Witt, Blume) and with Richard Newberg, AID/India.

The proposal was developed with the assistance of Dr. S. S. Johl, Chairman of the Department of Economics and Sociology at Punjab Agricultural University. The proposal calls for a collaborative research project to be undertaken jointly by faculty at OSU and faculty at PAU.

In January 1972, Dr. Johl returned to India where he plans to discuss the proposal with Punjab Agricultural University officials and with their approval submit it to ICAR in India. (See proposal dated December, 1971)

REPORTS ON COMPLETED RESEARCH PROJECTS

PROJECT NO. 1

TITLE: "An Economic Analysis of Fertilizer Utilization in Brazil"

STATUS: Research and Dissertation completed

PUBLICATIONS:

Research Notes

No. 1, Nelson, William C., Fertilizer - Brazil, 1970

No. 2, Nelson, William C., Credit & Fertilizer - Brazil  
December, 1970.

No. 3, Nelson, William C., Fertilizer Marketing - Brazil  
January, 1971

Dissertation

William C. Nelson, "An Economic Analysis of Fertilizer  
Utilization in Brazil", 1971.

PRINCIPLE INVESTIGATORS: William C. Nelson and Dale W Adams

PROGRESS REPORT:

The major objective of this research was to determine the economic factors which influence farm operators in their decision to use fertilizer in Southern Brazil. The specific factors analyzed were: (1) the economic environment which includes product and input prices; credit availability and interest rates, and liquidity levels; (2) the infrastructure which consists of credit facilities, dealer services and extension services; and (3) the management levels as measured by experience, education, social interaction and adoption of improved practices. Secondary objectives were to determine the crop response to fertilizer and optimum levels of fertilization, and to relate the consumption of fertilizer to capital formation on the farm.

This study was based on 173 of 383 farm interviews which were



carried out in July, 1970. The interviewing was done in the municipios of Guaira, Jardinopolis and Sales de Oliveira (annual crops), Sertaozinho and Pontal (sugar cane), Altinopolis and Batatais (coffee), and Barretos and Columbia (beef cattle). All municipios are located in the region of Ribeirao Preto in the extreme northeastern portion of Sao Paulo.

Research findings indicate a widespread utilization of chemical fertilizers on annual crops during the 1969/70 agricultural year when 97 percent of the sample farmers applied fertilizers. However, only 45 percent of the farmers analyzed their soils, only 60 percent applied lime, and rate of fertilizer application was less than 50 percent of the recommended rates.

A most interesting result of the research was the generally low returns to nitrogen use among the farms studied. Even the low levels of nitrogen applied appeared to have little positive impact on output.

PROJECT NO. 4

TITLE: "Alternative Enterprise Combinations under Various Price Policies on Wheat and Cattle Farms in Southern Brazil"

STATUS: Initial phase completed - followup work continuing as part of wheat study

COMPLETION DATE: July, 1971

PUBLICATIONS:

Engler, Joaquim J. de C., I. J. Singh, "Production Response to Technological and Price Changes: A Study of Wheat and Cattle Farming in Southern Brazil," The Ohio State University, Occasional Paper No. 33, June, 1971

Engler, Joaquim J. de C., "Alternative Enterprise Combinations under Various Price Policies on Wheat and Cattle Farms in Southern Brazil," Ph.D. Thesis, Department of Agricultural Economics and Rural Sociology, the Ohio State University, 1971.

PRINCIPLE INVESTIGATORS: Joaquim J. de C. Engler and John H. Sitterley

The purpose of this study was to analyze the impact of various price policies on the production of wheat and competing farm outputs in Southern Brazil. This was done explicitly with the help of a programming model that included alternative production technologies and was formulated to simulate the impact of varying prices and resource availabilities.

The importance of such a study is twofold. First, the region under consideration is among the few areas in the world that have seen a tremendous increase in total agricultural productive capacity (i.e. agricultural capital formation) and the resultant increases in total output and productivity. This has come about through rapid mechanization, changes in cropping patterns, and increases in the use of non-farm inputs such as fertilizers, seeds and credit. Second, and the greater topical importance of the study lies in the need to analyze the impact of these new technologies

in the context of the Brazilian program to increase self-sufficiency in wheat. The program initiated in 1962/63 centers around a government policy to purchase wheat at a fixed price assured to stimulate production and stabilize the market for wheat. As wheat production has become relatively profitable, farmers have shifted out of the traditional extensive livestock enterprises to the intensive cultivation of wheat.

In view of the increased availability and adoption of new technologies, and the apparent goal of the Brazilian governments to reduce real domestic wheat prices in the long run, the relevant policy questions that this study attempted to answer included:

What would be the impact on production, resource use and adoption of new technologies of:

- 1) Changes in the domestic price of wheat?
- 2) Changes in the relative price of other outputs, particularly beef?
- 3) Changes in the interest rates on credit for modern inputs?

The main conclusions of the study are:

- 1) At 1969/70 support prices (approximately \$110. per metric ton) an intensive double cropping pattern with wheat followed by soybeans is the most profitable and it can be expected that at these price levels a transition from extensive livestock production to intensive double cropping will continue, at current levels of productivity.
- 2) A reduction in the domestic support price of wheat to the world price level will make it unprofitable for both current wheat producers in the short run and current and potential wheat producers in the long run to produce wheat.

- 3) Although wheat prices can be reduced between 35-40% in the short run and between 15-20% in the long run without affecting the production of wheat, such changes would substantially reduce the net returns per hectare and the farm incomes of current and potential wheat producers.
- 4) Unless beef productivity is raised by conversion to improved pasture it cannot compete successfully with a wheat-soybean double cropping system, even when support prices decline. In the case of productivity increases a regional transition from extensive livestock production to production with improved winter and summer pasture can be expected.
- 5) Increasing the relative price of beef without increasing beef yields would require increases in the range of 250-300% before beef becomes a competitive enterprise. Such price increases would require a domestic price support program several times as costly as the current wheat program.
- 6) Total demand for working capital and credit is insensitive to short run changes in wheat prices, but the demand declines somewhat in the long run.
- 7) The internal rate of return suggests that credit is a substantially underpriced resource, and interest rates could be raised substantially without affecting the present rate of borrowing.

Further Research

The following items should be included in an agenda for further research:

- 1) The possibility of reducing the wheat support prices and the substitution of livestock production on improved pasture should be more fully investigated. These alternatives should include the investigation of export possibilities of Brazilian beef to earn foreign exchange to import total Brazilian wheat requirements.
- 2) Since it is evident that at current levels of productivity domestic wheat prices cannot be substantially reduced and still maintain production, the feasibility of increasing wheat yields should be investigated.
- 3) Since the current analysis is for a representative farm size and since the farm size issue is of some importance in Southern Brazil the analysis could be extended to include

PROJECT NO. 8

TITLE: "Capital Formation on Small-to-medium sized Farms in Southern Brazil, 1965-1969"

STATUS: Research and M.S. Thesis completed

PUBLICATIONS:

Research Notes

No. 5 - Adams, Dale W, and Joseph L. Tommy, Credit - Brazil, April, 1971.

No. 8 - Adams, Dale W, William Simpson and Joseph Tommy, Credit - Brazil, June, 1971.

Thesis

Tommy, Joseph Lissa, "Credit Use and Capital Formation on Small to Medium Sized Farms in Southern Brazil, 1965-1969"

PRINCIPLE INVESTIGATORS: Joseph Tommy and Dale Adams

PROGRESS REPORT:

The main objective of this study was to document the capital base and credit use of a sample of small-to-medium sized farms in Southern Brazil from 1965 to 1969. The study was based on 289 farm interviews done in 1965 and 1969. All farms were located in the states of Rio Grande do Sul and Santa Catarina.

The research focused mainly on documenting changes in credit use among these farmers over the 1965 to 1969 period. The analysis showed that the substantial increase in institutional agricultural credit in Brazil has apparently gone to a rather narrow group of farmers, mainly those who had been receiving significant amounts of credit in 1965. Only very modest amounts of capital was being formed on those units which did not use agricultural credit.

PROJECT NO. 13

TITLE: "Input Productivity and Productivity Change of the Crop Enterprise in Southern Brazil"

STATUS: Study Completed. Manuscript in preparation

TENTATIVE COMPLETION DATE: July 1, 1972

PUBLICATIONS:

Steitieh, Akram Mustafa, "An Analysis of Input Productivity and Productivity Change on Crop Enterprise in Southern Brazil," Ph.D. Thesis, Department of Agricultural Economics and Rural Sociology, the Ohio State University, 1971.

PRINCIPLE INVESTIGATORS: Akram Steitieh and Francis Walker

PROJECT NO. 16

TITLE: "Analysis of Factors Associated with Variations in Land and Labor Productivity in Southern Brazil"

STATUS: Manuscript in draft form.

TENTATIVE COMPLETION DATE: July, 1972

PUBLICATIONS:

Barranda, Nelson A., "Analysis of Factors Associated with Variation in Land and Labor Productivity in Southern Brazil," M.S. Thesis, Department of Agricultural Economics and Rural Sociology, the Ohio State University, 1970.

PRINCIPLE INVESTIGATORS: Nelson A. Barranda and Bernard L. Erven

PROGRESS REPORTS ON CONTINUING  
RESEARCH PROJECTS



PROJECT NO. 2

TITLE: "Economics of Agricultural Mechanization in Southern Brazil"

STATUS: data analysis

TENTATIVE COMPLETION DATE: May, 1972

PUBLICATIONS:

Stitzlein, John, Agricultural Mechanization - Southern Brazil,  
Research Note #4 - the Ohio State University, March, 1971

Souza, Eli de Moraes, John Stitzlein, et. al., "Formacao de Capital  
e Mudancas Tecnologicas ao Nivel de Empresas Rurais --  
Lajeado, Carazinho, e Nao-Me-Toque - RS," Relatorio Descritivo  
(Preliminary report), 1970, IEPE/UFRGS, Porto Alegre.

Souza, Eli de Moraes, John Stitzlein, et.al., "Formacao de Capital  
e Mudancas Techologicas ao Nivel de Empresas Rurais --  
Sao Borja - RS," Relatorio Descritivo (Preliminary report),  
1970, IEPE/UFRGS, Porto Alegre.

PRINCIPLE INVESTIGATORS: John Stitzlein and Norman Rask

PROGRESS REPORT:

The objective of the study is to assess some of the socio-economic consequences that appear to be associated with agricultural mechanization in developing countries. Specifically, the analysis is directed toward (1) labor utilization, (2) land productivity, (3) labor productivity, and (4) production efficiency.

Farm survey data from four municipios (counties) in southern Brazil provide the primary basis for the analysis. The observations are divided according to tractor ownership, and depict or characterize three general but somewhat different situations. The first is one wherein mechanization has been accompanied by size increases in family farms generally engaged in both crop and livestock production; in the second, enterprise change has been the predominant modification coupled with mechanization as tracts

of grazing land are brought into crop production; and in the third, neither a change in farm enterprise nor size appears to accompany the adoption of mechanization on smaller, partially-irrigated farms producing crops and livestock.

After comparing land, labor, capital inputs and productivity measures for the subsamples within each of the situations, covariance analysis is employed to examine the differences between the mechanized and non-mechanized observations. Regression analysis is then used to measure the influence of annual machine cost in the mechanized and non-mechanized groups. Annual machine cost is a composite variable consisting of depreciation, fuel, parts and net machine rental.

In brief, the analysis indicates machinery need not replace labor. Only in the first situation does mechanization have a significant negative influence on labor. The influence is positive in the second, and is not significant in the third. Incurring higher per hectare machine costs would increase employment significantly on the non-mechanized farms of the first situation and the mechanized farms of the second. No significance was noted in the other four groups.

Mechanized farms have levels of land and labor productivity much superior to the non-mechanized farms in the first two situations. In the no change (third) situation, the difference is much smaller. Profits would be increased substantially by incurring additional machine costs on the non-mechanized farms in the first and third situations and on the mechanized farms in the second. The mechanized farmers in the size change and no change (first and third) situations would find it profitable to reduce their machine costs slightly and although it is not entirely clear, it appears the non-mechanized farmers in the second situ-

ation would increase their profits by applying additional amounts of this input.

While the mechanized farms are more efficient (as measured by non-land costs/total production) than the non-mechanized farms in the size change situation, the difference is not significant in the other two situations. The efficiency of the non-mechanized in the size change situation would increase if larger machine costs were incurred, but the opposite would occur for the mechanized in this and the no change situation.

PROJECT NO. 3

TITLE: "Brazil's Program for Increased Self-sufficiency in Wheat"

STATUS: Some aspects have been analyzed and reported in preliminary form, others are being studied, and additional data was recently collected.

TENTATIVE COMPLETION DATE: January, 1973

PUBLICATIONS

Meyer, Richard L., and Donald Larson, 'Brazil's Program for Increasing Wheat Production - The Ohio State University Research Note No. 7, May, 1971.

PRINCIPLE INVESTIGATORS: Norman Rask, Richard Meyer, and Joaquim Engler

PROGRESS REPORT:

In 1962 and 1963, Brazil began initiating a set of policy instruments and programs designed to stimulate domestic wheat production in order to reduce its reliance on foreign supplies. The outcome has been a large increase in production, especially in recent years, and the country has now reached a point of producing over 50 percent of domestic consumption. Individual farms have undergone a series of transformations as farmers initiated and specialized in wheat growing. Community-level infrastruc-

ture has expanded as agri-businesses responded to the increased demand for inputs and services, and the public sector attempted to provide associated public services. Entire municipios in four or five years have been transformed from quiet pastoral activities to the bustle associated with wheat farming.

The key to this growth has been the creation of an assured wheat market with subsidized domestic prices. This direct price subsidy and other programs such as subsidized credit have constituted a substantial capital transfer from the non-agricultural to the agricultural sectors.

Brazil's experience with wheat is an interesting case study for analysis for several reasons. First, it is a successful example of how manipulation of price and credit policies has stimulated a rapid expansion in output of a specific commodity. In the process, farmers have rapidly adopted new technology in the form of purchased inputs, fertilizer, and mechanization. The speed of adoption has been so rapid as to create readily identifiable secondary effects such as the amount and variety of inputs and services provided in rural communities. Secondly, these policies have resulted in an effective intersectoral capital flow which merits evaluation both in terms of the benefits derived and applicability to other situations and commodities. Finally, this is a domestic program lacking any kind of direct foreign assistance and, therefore, may have implications for other developing countries.

This study is part of a team effort and includes the input of other individual studies (such as Project No. 4) and serves as a mechanism to initiate others (such as Project No. 5). A central consideration will be the on-farm capital formation and transformation process that

has accompanied the farm-level response to the wheat program incentives. A regional recursive programming model, a price sensitivity study of wheat and beef, and a non-farm rural infrastructure are all complementary activities. A basic overview will trace the evaluation of the wheat program; describe the salient factors contributing to its success; identify and quantify, when possible, the most important direct and indirect program costs; and measure the effects on farms, agri-businesses, and rural communities. An additional phase is now being planned to test the possibility of productivity increases through genetic and other agronomic research.

In response to the wheat program, significant farm-level capital formation and transformations have occurred.

In the most extreme transformation situation (from extensive livestock grazing to intensive crop farming) very dramatic investment and output changes have occurred. A direct comparison of land being used for livestock production with other land under wheat production shows a one-third increase in on-farm investment and a sixteen fold increase in operating expenses for the wheat land. Further, hired labor increased three times and levels of output show a nine fold increase.

Several non-farm transformations have also occurred in farm input and product markets with related effects on rural communities. As reported in Research Note No. 7, these include:

1. The total number of input and product dealers has expanded, sales have rapidly increased, and services have increased.
2. These changes have benefited farmers by providing a good supply of farm inputs close at hand.
3. Technical advice provided by dealers has stimulated adoption

of new inputs, thereby contributing to agricultural modernization and making possible the tremendous growth in agricultural production experienced in the municipios studied.

4. Rural communities have felt the effects of increased farm output and expansion in farm input suppliers through creation of employment opportunities; investment in land, buildings, equipment, and inventories by these dealers; and expenditure of cash operating expenses in the local economy. A secondary effect of this economic activity has been a marked increase in motor vehicle sales.

The conclusions and implications of Project No. 4 have provided the basic information for the wheat and beef price sensitivity analysis. (page 19)

This research has demonstrated the productivity problem of Brazilian wheat production. With high soybean prices and rising beef prices, there is increasing competition for resources to dedicate to wheat raising. The problem is compounded by a decline in wheat yields in 1970/71 of 10 to 20 percent. It appears that productivity increases are necessary to maintain high levels of wheat production even if wheat prices are supported at high levels.

For this reason, another phase of the project was initiated in December, 1971 with the interviewing of key geneticists and other agronomic scientists conducting research which is hoped to eventually increase productivity. The objectives of these interviews were to identify the principal factors inhibiting productivity increases, project the probable production system associated with future wheat varieties, and estimate potential costs and returns from developing improved varieties.

PROJECT NO. 5

TITLE: "A Recursive Linear Programming Model of Agricultural Development in Southern Brazil"

STATUS: Model Improvement, Analysis and Policy Applications

TENTATIVE COMPLETION DATE: June, 1972

PUBLICATIONS:

C. Y. Ahn, "A Recursive Programming Model of Agricultural Development with Farm Size Decomposition: A Case Study of Southern Brazil," the Ohio State University, Occasional Paper No. 44 November, 1971.

I. J. Singh and C. Y. Ahn, "Capital-Labor Substitution in Brazilian Agriculture," a study for the International Bank for Reconstruction and Development (forthcoming).

PRINCIPLE INVESTIGATORS: I. J. Singh and C. Y. Ahn

PROGRESS REPORT:

The purpose and methodology of this study have already been outlined in a previous report (Second Annual Report, July, 1971). Since then there has been substantial progress in the study, and preliminary model results are available and have been reported (see Ahn, C. Y., op. cit.). The dynamic results covering the decade 1960-1970 for the wheat growing regions of Rio Grande do Sul, have been most encouraging. The model was useful in explaining the process of regional transformation from range livestock to crop farming in the region with particular emphasis on farm size differences and technological change. The time paths of regional resource use, investment patterns, factor productivities, factor proportions, and capital and credit use were predicted by farm size and the model proved most useful in explaining:

- a) The path of regional development in the dynamic context of adjustment to technological change, factor endowments, economic incentives and policy parameters.
- b) The differential development paths of different farm sizes given

different initial factor endowments but the same economic environment, and policies.

- c) The impact of intra-farm competition for regional resources (especially credit) on regional development.

The regional model is now being used to analyze the impact of changing factor prices and factor endowments upon long-run and short-run capital-labor substitution in the region through the use of parametric programming. Comparative dynamic results for three selected years (1960, 1965, and 1970) are now being analyzed and will be reported in February 1972 (see Singh and Ahn op. cit.). This is one of the policy applications of the current model.

An additional application involves the simulation of the model for different credit parameters (credit availability and interest rates) in order to evaluate the role of credit in regional development. The computer work for this is complete and analysis of the results is in progress.

Future work involves:

- a) Model improvements to incorporate seasonality in more detail,
- b) Use of the model for evaluating alternative product and factor pricing policies,
- c) A more detailed analysis of yield technologies,
- d) Model projections for the 1970-80 period, and
- e) Projections under alternative policy devices using the improved model for 1970-80 period.



PROJECT NO. 6

TITLE: "An Analysis of Capital Formation Patterns of Farms in Southern Brazil"

STATUS: Preliminary data analysis

TENTATIVE COMPLETION DATE: July, 1972

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: Roger L. Baur and Norman Rask

PROGRESS REPORT:

The basic objective of this study is to determine and describe the process of capital formation at the farm level in Southern Brazil. The specific objectives are:

- 1) to identify and determine the relative importance of various factors that are significantly important in the capital formation process on various types of farms by using an appropriate measure(s) of capital formation,
- 2) to identify the sequential steps in which these significant factors were acquired during the process of capital formation,
- 3) to identify differences in the sequential pattern of acquisition among various types of farms, and
- 4) to identify various determinants that influence the capital formation process.

Analysis of the data obtained from 728 interviewed farmers in the states of Rio Grande do Sul and Santa Catarina is underway to determine the important factors in the capital formation process. Preliminary analysis shows that current operating expenses, machinery investment and livestock investments are all important in explaining increases in productive capacity, a measure of capital formation.

Subsequent analysis will determine the pattern in which these factors were acquired and what variables influence the pattern.

PROJECT NO. 7

TITLE: "Small Farmer Credit Use in Southern Brazil - 1965-1971"

STATUS: Data analysis underway

TENTATIVE COMPLETION DATE: July, 1972

PUBLICATIONS:

Research Notes

No. 12 - "Small Farmer Credit in Brazil", November, 1971.

PRINCIPLE INVESTIGATORS: Gerald Nehman and Dale Adams

PROGRESS REPORT:

The objective of this study is to analyze the relative success of low-income farmers in gaining access to institutional agricultural credit programs in southern Brazil. One hundred and fifty farmers were interviewed during July, 1971 in the municipios of Itapetininga and Guaira, Sao Paulo. All data are now on cards and data verification is complete. The data were checked for errors of arithmetic, logic and omission. This was accomplished using the computer facilities of ESALQ. The programming was performed by Gerald Nehman and the programs will be made available for future use at ESALQ.

The distribution of the sampled farms is shown in Table 1. One can see that almost 50% of the sample consists of farms of 20 hectares or less. These farms are mostly low-income and traditional in terms of agricultural practices and crops raised. Agricultural production is mostly family consumption oriented (e.g. beans, eggs, milk, and chickens) and, in fact, a large proportion is consumed in the household.

Table 1. Distribution of Farms and Loans by Farm Size

Land Area (hectares)	F a r m s			L o a n s		Value of Loans (Cruzeiros)		
	Number	% of Sample	% with Loans	Number	% of Total	Total	Ave. value per loan	% of Total value
0-10	32	21.3	25.0	8	13.8	2,466	308	0.6
11-20	38	25.3	42.1	16	27.6	15,947	997	4.2
21-50	40	26.7	40.0	16	27.6	28,618	1,789	7.5
51-100	17	11.3	23.5	4	6.9	24,600	6,150	6.5
101-200	13	8.7	53.8	7	12.1	44,560	6,366	11.7
Over 200	10	6.7	70.0	7	12.0	265,070	37,867	69.5
<b>Total</b>	<b>150</b>	<b>100.0</b>	<b>38.7</b>	<b>58</b>	<b>100.0</b>	<b>381,261</b>	<b>6,573</b>	<b>100.0</b>

Of most interest to this study is the relationship between the use of subsidized agricultural credit and economic efficiency criteria of farm firms. It has been suggested in the literature that some small farms are underutilizing agricultural credit while large farms either do not use credit as efficiently as smaller ones or use it to invest outside of agriculture.

In this sample 39 percent of the farmers had at least one loan in force: 75 percent of these were subsidized through banks. The loans were fairly well distributed over the full size range of farms. In terms of value, however, farms up to 20 hectares received only 4.8% of the total amount lent, while they represented 46.6% of the farms in the sample. Farms over 200 hectares represented 6.7% of the sample and received 69.5% of the funds lent.

Data analysis will try to show if this highly skewed distribution of loaned funds is justifiable on the basis of resource allocation criteria. The effect of the agricultural credit programs on income distribution will also be examined using time series data. These two issues are discussed in Research Note No. 12.

PROJECT NO. 9

TITLE: "Capital Accumulation at the Farm Level, Sao Paulo, Brazil"

STATUS: Final stages of data analysis and interpretation. Writing up the results.

TENTATIVE COMPLETION DATE: March, 1972

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: Ivan Garcia and Kelso Wessel

PROGRESS REPORT:

The project is focusing on the form and extent of capital buildup on farms in the Sao Paulo region. Of primary interest is an analysis of whether capital formation is occurring among all economic classes and types of farms and if so is it occurring in the same form and rank.

Analysis is being made by stratifying the 383 farms into five types of farming:

- 1) Cash annual crop - more than 50% of cultivable land in cotton, rice, corn or soybeans
- 2) Perennial crop - more than 50% of cultivable land in coffee or sugar cane
- 3) General crops - more than 50% of cultivable land in other crops
- 4) Cattle - more than 50% of income from livestock
- 5) Cattle and crops - none of the above hold

Following this, each of the above types of farming is being divided into small, medium and large holdings. The analysis of different forms of capital formation is being based on this 3 X 5 matrix.

PROJECT NO. 10

TITLE: "The Degree of Readiness for Innovative Adoption Among Farmers in Southern Brazil"

STATUS: Preparation for statistical analysis

TENTATIVE COMPLETION DATE: Summer, 1972

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: Demissie G. Michael and David Francis

PROGRESS REPORT:

Objectives:

1. To document as background material in four municipios, two each in the states of Rio Grande do Sul and Santa Catarina (1965).

-- the nature of the farms: size, type

-- personal data of farmers: age, education, family size, aspiration, innovativeness and communication behavior, and other socioeconomic features

-- structural factors: agricultural services, community organization, infrastructures, credit and price policies, etc.

2. To separate farmers and farm groups on the basis of the variables listed above, assess the degree of their readiness for different innovations, and predict their innovative behavior and adoption rate of relevant farm practices.

3. To compare the changes that have occurred in the rate and patterns of adoption of farm technology between the years of 1965 and 1969.

-- check the results of the prediction with the 1969 data

-- identification and categorization of basic characteristics of adopter groups

-- identify factors responsible for explaining the rate of adoption and the differences noted.

-- measure the consequences and secondary effects of earlier (1965 and before) adoptions.

4. To analyze the interrelationship at the farm level between the adoption of farm innovations, capital formation and the growth of farm output.

PROJECT NO. 11

TITLE: "A Comparative Study for Predicting Adoption of New Ideas and Practices Among Farmers in Brazil"

STATUS: Currently in process of finalizing project proposal

TENTATIVE COMPLETION DATE: June, 1972

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: James L. Gingerich and David G. Francis

PROJECT NO. 12

TITLE: "An Examination of Sociological Variables Related to Capital Formation in a Brazilian Situation"

STATUS: Data gathering

TENTATIVE COMPLETION DATE: Fall, 1972

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: Solon J. Guerrero and David G. Francis

PROGRESS REPORT:

This study was planned to investigate the relationships between sociological variables and capital formation. The investigators arrived at ESALQ on September 20, 1971.

A questionnaire was developed and discussed with Dr. Jose Molina, Dr. Maria Ignez Guerra Molina, Dr. Oriowaldo Queda and Dr. Raphaela Carrozo Scardua. The questionnaire was extensively revised based on the suggestions provided by the above mentioned professors.

It was decided to initiate the interviewing in the municipio of Barretos, since excellent rapport had already been established with the local extension agents by the members of the economic study team.

Interviewers were recruited with the aid of local extension service personnel. They included advanced high school students and students from a nearby university. With the aid of several professors from ESALQ, eight interviewers from a total group of sixteen were selected and trained.

The research will include the following categories of interviews:

Farmers interviewed in the previous economics study	- 383
Random sample from the general population	- 190
Local leaders in each municipio	- <u>80</u>
	653

For reasons of farmer movement out of the municipios, or lack of addresses, it is expected that about 50 of these interviews will not be completed.

Interviewing began on November 9 in Barretos. All eight interviewers did not participate full-time in the work because of school examinations. By the end of December, all the interviewers will be able to participate in the work full-time. By December 31, the following interviews had been completed:

<u>Municipio</u>	<u>Farmers</u>	<u>Random Sample</u>	<u>Leaders</u>	
Barretos	34	33	9	= 76
Colombia	7	5	1	= 13
Guaira	35	20	0	= 55
Total	76	58	10	= 144

This total of 144 completed interviews represents 24% of the total number of questionnaires to be administered.

For the municipios of Barretos, Colombia and Guaira, interviewers have operated out of Barretos because of housing facilities, support of the extension service (which serves the same municipios) and the need for the interviewers to go to school in the evening.

The study will continue in the data collection phase until the 600+ interviews have been gathered. After completion of the farmer and random sample questionnaires additional emphasis will be placed on obtaining information from local leaders. These will include officials of cooperatives, rural syndicates, usinas, cultural associations and other local organizations. It is anticipated that the data collection phase of the study will be completed by March 31, 1972.



PROJECT NO. 14

TITLE: "Consumption - Investment Behavior and Savings Potential  
in Rural Areas of Brazil -- 1965-1969."

STATUS: Data analysis (see Project No. 21)

TENTATIVE COMPLETION DATE: December, 1972

PUBLICATIONS:

Rask, Norman, and E. Wayne Denney, Rural Savings - Brazil,  
Research Note No. 6, The Ohio State University,  
October, 1971.

Denney, E. Wayne, "An Analysis of Income, Consumption, and  
Savings Potential at the Farm Level in Southern Brazil."  
M.S. Thesis, Department of Agricultural Economics and  
Rural Sociology, The Ohio State University, 1970.

PRINCIPLE INVESTIGATORS: Norman Rask and E. Wayne Denney

PROGRESS REPORT:

The main purpose of this study is to investigate the savings potential being generated on selected farms in Southern Brazil. The central hypothesis is that the introduction of new and profitable technologies has dramatically changed the savings-investment picture on farms in Southern Brazil. With an expected lag in consumption response, the increased income generated from the employment of new technology can serve as a pool of surplus capital to fuel further expansion in the productive capacity of agriculture. The specific objectives are:

- 1) To determine the functional relationship between consumption and income for farms of various sizes,
- 2) to describe the investment patterns of farms at different income levels, and
- 3) to measure the potential for rural savings both internal and external to the farm.

The data is drawn from two sets of farm-level surveys carried out in several farming regions of Southern Brazil. This area has experienced a revolution in the use of many forms of modern technology during the past decade. The farm-level data was collected for the calendar years 1965 and 1969 in the southern two states of Rio Grande do Sul and Santa Catarina. Approximately 1/3 of the observations are from the same farms in both time periods. Analysis of 821 farm records from the 1965 data is completed.

PROJECT NO. 15

TITLE: Rural Capital Formation, state of Rajasthan, India

STATUS: Data Analysis

TENTATIVE COMPLETION DATE: January, 1973

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: J. C. Kalla and Norman Rask

PROGRESS REPORT:

With the progress of the new seed-fertilizer revolution in some areas of India and Pakistan, the problem of finding sufficient capital resources for spreading the revolution over a sufficiently large part of the agricultural sector has acquired additional importance. The production, distribution and application of the new inputs -- seeds, chemical fertilizers, pesticides, irrigation facilities, better tools, etc. -- requires massive new investments. The governments in South Asia have been taxing agriculture lightly and spending about a quarter of their total developmental expenditure directly, and a lot more indirectly, on the agricultural sector. But they cannot be expected to allocate much more for agriculture without impairing the prospects of balanced growth. Therefore, additional resources for agricultural investment must be generated and mobilized within and from the agricultural sector itself. But the knowledge of the saving-investment behavior of tradi-

tional and innovating peasants is extremely inadequate. The study is a modest beginning to fill this critical gap in knowledge about an increasingly important problem.

The study concerns a cross-section study of of saving and investment behavior of peasant units in the Rajasthan region of India. A sample of 150 farmers from three villages was surveyed in great detail, to develop alternative measures of saving-investment, income and consumption, and to identify the important causal relationships between these variables.

The results of the study will be used to investigate the current controversies in the literature about the following items: minor land and irrigation improvements which do not survive more than one year; the imputation of the cost of investment with family labor; and the break-up of expenditure on family transport and construction into consumption and investment in a situation where the same vehicle or construction is used partly for both purposes.

Special attention will be given to the identification of dynamic changes in the structure of investment which follow increases in income due to new technology. Suggestions about policy measures required to encourage desirable changes will follow:

These hypotheses suggested by the available literature will be tested in the study:

- 1) That the average saving propensities of farmers are not abnormally low in comparison with non-farmers in similar income brackets.
- 2) That the availability of new, highly profitable technical inputs brings out additional saving potential. (Implicitly this means that incomes generated in traditional agriculture had been low not because savings rates were low but because savings were embodied in technically inefficient forms.)
- 3) Institutional facilities to channel rural savings into productive forms are urgently needed.

PROJECT NO. 17

TITLE: "The Capital Formation, Growth and Development of Local Marketing Firms in a Modernizing Agriculture: the Ribeirao Preto region of Sao Paulo

STATUS: Field work completed

TENTATIVE COMPLETION DATE: December, 1972

PUBLICATIONS: none

PRINCIPLE INVESTIGATOR: Donald Larson

PROGRESS REPORT:

The general objective of this study is to examine the relationship between capital formation and modernization on farms and the development of marketing facilities at the community level. More specifically these objectives are: (1) To describe and analyze the marketing system in a rapidly developing agricultural region, (2) To identify the historical development of the marketing system in that same region, (3) To study the importance of linkages between producing and marketing sectors in affecting the rate and type of farm capital formation, and (4) To evaluate the impact of selected government policies upon the development of the marketing system.

The Brazilian government in recent years has developed a set of policies and programs designed to modernize and increase productivity of its agricultural sector. These policies, mainly credit subsidies and price supports, have fomented a rapid modernization of the agricultural sector. Farms have increased their production, and use of non-farm inputs such as fertilizers, machinery, seeds and pesticides. This modernization has created new opportunities for product and input marketing firms in the community. The impact of this agricultural modernization process upon capital formation and growth of marketing firms is the subject of this investigation.

The Ribeirao Preto region of Sao Paulo was selected for this study because of its highly diversified and rapidly modernizing agricultural sector, and because 383 farm level interviews were completed in ten municipios of that region in July of 1970. Interviews with 143 marketing firms were completed in September in the same municipios. The questionnaires have been revised and the data punched on IBM cards. Data tabulation will begin shortly.

PROJECT NO. 18

TITLE: "Comparative Farm Returns of Beef Production Systems"

STATUS: First stage of data analysis underway at ESALQ, Sao Paulo

TENTATIVE COMPLETION DATE: April, 1972 for first stage

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: Leda Rilho Perroco and Richard L. Meyer

PROGRESS REPORT:

Brazil's cattle population is fourth largest in the world, yet the slaughter rate is considerably less than other major beef producing countries. Various programs have been employed to try to improve outdated production techniques. Both the World Bank and International Development Bank have made loans to Brazil to finance investments on cattle farms. In spite of these efforts, increases in beef production are generally obtained from increased herd size rather than higher yield coefficients.

This first stage of research using Sao Paulo survey data is part of a larger project to study the returns of cattle production. It is expected that the low returns from cattle compared to other farm enter-

prises, and low returns from improved technology will largely explain the low levels of production technology currently employed. Subsequent stages of analysis will test these hypotheses using data from surveys conducted in Rio Grande do Sul and Minas Gerais.

PROJECT NO. 19

TITLE: "Credit Use and Farm Mechanization in Sao Paulo"

STATUS: Data analysis underway at ESALQ, Sao Paulo

TENTATIVE COMPLETION DATE: May, 1972

PUBLICATIONS: None

PRINCIPLE INVESTIGATORS: Tonan Kudo and Richard L. Meyer

PROGRESS REPORT:

Brazilian agricultural credit policy during the last 6-8 years has included highly subsidized loans for acquisition of, first, imported farm machinery, and later, domestically produced equipment. The result has been a rapid expansion in total credit used for such purchases, an increase in domestic manufacture of farm equipment, and an expansion in mechanization of cultural practices for many crops. Current agricultural policy calls for maintenance of such credit facilities and a continued rapid expansion of agricultural mechanization. A specific goal is to increase the numbers of tractors in operation from a level of 80,000 in 1969 to 120,000 in 1973.

Although such a policy may have contributed to an increase in output and farm income on affected farms, it may have distorted resource combinations and stimulated mechanization beyond economically optimum

levels. If true, this conclusion has obvious economic and social implications for a country with an under-employed labor force. The objective of this project is to test this issue with data from a set of farms included in the Ribeirao Preto survey in Sao Paulo which have rapidly increased their ownership of tractors in the last several years.

Preliminary analysis of the data demonstrates the rapid recent increase in mechanization. The 383 farms included in the sample owned almost 500 tractors of which 300 were purchased after 1964, and 45 percent of those in the agricultural year 1969/70. There is also a close relationship between the use of institutional credit and acquisition of tractors and other types of farm mechanization.

PROJECT NO. 20

TITLE: "Analysis of the Process of Farm Investment in Sao Paulo"

STATUS: Preliminary stages of data analysis underway at ESALQ, Sao Paulo

TENTATIVE COMPLETION DATE: June, 1972

PUBLICATIONS: none

PRINCIPLE INVESTIGATORS: Roberto Jose Moreira and Richard L. Meyer

PROGRESS REPORT:

The private investment rate of an economy is an important variable in determining future growth and development. Investment on farms is determined by the level of financial resources available to the farm operator, the level of return expected from non-farm investments, and motivational factors including risk considerations. The summation of all farmer investment decisions establishes the magnitude of capital flows into and out of the agricultural sector.

The objective of this research project is to study the nature and magnitude of new farm investments on a set of farms included in the Ribeirao Preto survey in Sao Paulo. Variables such as asset level, farm and non-farm income, and characteristics of the farm family such as age, composition, and educational level will be correlated with both farm and non-farm investments made during the agricultural year 1969/70. This project is expected to contribute to the consumption, investment and savings studies under projects numbered 14 and 21.

PROJECT NO. 21

TITLE: "An Analysis of the Consumption-Saving Relationship on Selected Farms in the Ribeirao Preto Region of Sao Paulo, 1970"

STATUS: Data analysis

TENTATIVE COMPLETION DATE: December, 1972

PUBLICATIONS: none

PRINCIPLE INVESTIGATORS: Donald W. Larson and Lenildo Fernandes Silva

PROGRESS REPORT:

This study is closely related to Project No. 14. The main purpose is to investigate the savings potential being generated on selected farms in the state of Sao Paulo. The main hypothesis to be tested is that the introduction of new and profitable technologies has dramatically changed the savings-investment picture on farms in Sao Paulo. Another hypothesis to be tested is that savings propensities do not differ widely between different farm income groups. The specific objectives are:



- 1) To determine the functional relationship between consumption and income for different farm sizes;
- 2) To describe the investment patterns of farms at different income levels,
- 3) To measure the potential for rural savings on farms.

Interviews with 383 farmers in ten municipios of the Ribeirao Preto region completed in July, 1970 supply the basic data for this study. One M.S. thesis using data from three municipios has nearly been completed at ESALQ. Preliminary results indicate that a logarithmic function provides a better fit than a linear model. Additional analysis will be completed utilizing all the municipios plus Itapetininga - a municipio with many small farmers and more traditional than Ribeirao Preto.

**PROJECT NO. 22**

**TITLE: "Socio-Economic Characteristics of the Labor Input on Southern Brazilian Farms"**

**STATUS: Project conceptualization in process**

**TENTATIVE COMPLETION DATE: December, 1972**

**PUBLICATIONS: None**

**PRINCIPLE INVESTIGATORS: Steve Yoder and Bernard Erven**

**PROGRESS REPORT:**

Work on the project thus far has involved identification on a general orientation and literature review.

PROJECT NO. 23

TITLE: "The Relationship of Ethnic Background to Capital Formation  
in Southern Brazil"

STATUS: Data gathering

TENTATIVE COMPLETION DATE: January, 1973

PUBLICATIONS: none

PRINCIPLE INVESTIGATORS: Hagop Kayayan and David G. Francis

PROGRESS REPORT:

To elaborate on the sociological aspects of capital formation as examined in Project 12 this study will focus on that relationship of ethnic background to capital formation. Three major nationality groups will be considered for purposes of comparison. These will include:

- a. Italian
- b. Portuguese
- c. Japanese

The specific purposes of the research will be:

- a. To measure and compare the rate of capital formation over time for the various nationality background groups based on data previously collected;
- b. To compare the different ways (types) of capital formation of these groups. It is expected that the nationality groups will differ in the proportion of the various inputs involved in capital formation.

If significant differences are found to exist among all, or some of these groups, the following motivational patterns will be studied as possible explanations of the differences:

Individual level variables

- a. Achievement orientation;
- b. Fatalism and traditionalism;
- c. Religiosity and level of superstition;
- d. Organizational membership; and
- e. Value system. (Attitudes toward physical labor, saving for the future, etc.)

Family level variables

- a. Extended vs. nuclear family;
- b. Family size;
- c. Number of relatives living with the family; and
- d. Family solidarity.

The above sets of individual and family level variables are hypothesized to be related to nationality background and will be examined from that point of view.

If significant differences are not found to exist among the various nationality background groups, the above mentioned variables, in addition to the following community level variables, will be investigated as to their relationship with capital formation. (Irrespective of nationality background).

- a. Structural differentiation;
- b. Relative centrality; and
- c. Economic infrastructure.

Progress

Interviewing for this project began in November, 1971 in the area of Ribeirao Preto. By December 31, 158 of the planned 600 interviews

had been completed. These included interviews with 9 local leaders, 54 persons randomly selected from the general population, and 95 farmers that were interviewed by the project a year earlier for economic data.

A preliminary review of the data collected suggests a significant difference between leadership patterns in fairly adjacent municipios. One has diffused Syrio-Lebanese leadership with largely a Portuguese population. The economic elites appear to have limited contact with the political elites. Another has much less diffused Japanese leadership. The third is composed of large Italian landowners who are economically integrated into the economic life of the region. The economical elites overlap with the political elites, and local resources are used in behalf of the municipio.

## PUBLICATIONS

The following project and project-related publications have been prepared since project activities were initiated.

### Journal Articles

Adams, Dale W, "Agricultural Credit in Latin America: A Critical Review of External Funding Policy," American Journal of Agricultural Economics, May, 1971.

\_\_\_\_\_, "What can Underdeveloped Countries Expect from Foreign Aid to Agriculture: Case Study: Brazil - 1950-1970," Inter-American Economic Affairs, Vol. 25, No. 1, Summer, 1971.

\_\_\_\_\_, "External Credit Policy for Latin America: Reply," Forthcoming American Journal of Agricultural Economics.

Rask, Norman, "The Impact of Selective Credit and Price Policies on the Use of New Inputs," Development Digest, Vol. IX, No. 2, April, 1971.

Singh, I. J., "The Transformation of Traditional Agriculture: A Case Study of Punjab, India," published in the American Journal of Agricultural Economics, May, 1971.

### Economics and Sociology Mimeographs

Sorenson, Donald M., Norman Rask and Francis E. Walker, "Capital Productivity on Specialized Swine Farms in Southern Brazil," Department of Agricultural Economics and Rural Sociology, The Ohio State University, ESM No. 459, February, 1971.

### Department Occasional Papers

Rask, Norman, "Analysis of Capital Formation and Utilization in Less Developed Countries," Terminal Report for Research Project Occasional Paper No. 4, Ohio State University, December, 1969.

\_\_\_\_\_, "Analysis of Capital Formation and Technological Innovation at the Farm Level in LDC's," First Annual Report for Research Project, Occasional Paper No. 14, Ohio State University, July, 1970.

Singh, I. J., "Tubewell Irrigation in the Punjab," Occasional Paper No. 17, Ohio State University, November, 1970.

\_\_\_\_\_, "The Strategic Details of Development, Traditional Agriculture," Occasional Paper No. 18, Ohio State University, November, 1970.

- Singh, I. J., "A Regional R.L.P. Model of Traditional Agriculture," Occasional Paper No. 19, Ohio State University, November, 1970.
- Johl, S. S., "Mechanization, Labor-Use and Productivity in Indian Agriculture," Occasional Paper No. 23, Ohio State University, December, 1970.
- Rask, Norman, "Analysis of Capital Formation and Technological Innovation at the Farm Level in LDC's," Progress Report for Research Project, Occasional Paper No. 26, Ohio State University, January, 1971.
- Adams, Dale W, "Rural Capital Formation and Technology: Concepts and Research Issues," Occasional Paper No. 29, Ohio State University, April, 1971.
- Engler, Joaquim J. de C., I. J. Singh, "Production Response to Technological and Price Changes: A Study of Wheat and Cattle Farming in Southern Brazil," Occasional Paper No. 33, Ohio State University, June, 1971.
- Rask, Norman, "Analysis of Capital Formation and Technological Innovation at the Farm Level in LDC's," Second Annual Report for Research Project, Occasional Paper No. 35, Ohio State University, July, 1971.
- Johl, S. S., "An Analysis of Shifting Relative Prices and Marketing Facility Investments in the Context of Technological Change in the Developing Countries," Occasional Paper No. 37, Ohio State University, October, 1971.
- \_\_\_\_\_, "Agricultural Taxation in a Developing Economy: A Case Study of India," Occasional Paper No. 39, Ohio State University, September, 1971.
- \_\_\_\_\_, "Process of Growth in a Dualistic Economy: The Interaction of Population Growth and Technological Improvements in Agriculture," Occasional Paper No. 40, Ohio State University, 1971.
- Day, Richard H., and I. J. Singh, "A Microeconomic Study of Agricultural Development," Occasional Paper No. 43, Ohio State University, October, 1970.
- Ahn, Choong Yong, "A Recursive Programming Model of Agricultural Development with Farm Size Decomposition: A Case Study of Southern Brazil," Occasional Paper No. 44, Ohio State University, 1971.
- Singh, I. J., "The Consumption Behavior of Peasant Households: A Case Study of Punjab, India," Occasional Paper No. 45, Ohio State University, November, 1971.
- Erven, Bernard L., and Norman Rask, "Credit Infusion as a Small Farmer Development Strategy -- The Ibiruba Pilot Project in Southern Brazil," Occasional Paper No. 48, Ohio State University, December, 1971.
- Adams, Dale W, "Comment on Doreen Warriner's Paper," Occasional Paper No. 52, Ohio State University, December, 1971.
- Johl, S. S., "Growing Labor-force and Unemployment," Occasional Paper No. 53, Ohio State University, December, 1971.

### Theses

- Barranda, Nelson A., "Analysis of Factors Associated with Variation in Land and Labor Productivity in Southern Brazil," M.S. Thesis, Department of Agricultural Economics and Rural Sociology, Ohio State University, 1970.
- Denney, E. Wayne, "An Analysis of Income, Consumption, and Savings Potential at the Farm Level in Southern Brazil," M.S. Thesis, Department of Agricultural Economics and Rural Sociology, Ohio State University, 1970.
- Engler, Joaquim J. de C., "Alternative Enterprise Combinations Under Various Price Policies on Wheat and Cattle Farms in Southern Brazil," Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, The Ohio State University, 1971.
- Nelson, William C., "An Economic Analysis of Fertilizer Utilization in Brazil," Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, Ohio State University, 1971.
- Rao, Bodepudi Prasada, "The Economics of Agricultural Credit Use in Southern Brazil," Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, Ohio State University, 1970.
- Steitieh, Akram Mustafa, "An Analysis of Input Productivity and Productivity Change on Crop Enterprise in Southern Brazil," Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, Ohio State University, 1971.
- Tommy, Joseph L., "Credit Use and Capital Formation on Small-to-Medium Sized Farms in Southern Brazil - 1965-1969," M.S. Thesis, Department of Agricultural Economics and Rural Sociology, Ohio State University, 1971.

### Research Notes

- No. 1, Nelson, William C., Fertilizer - Brazil, December, 1970.
- No. 2, Nelson, William C., Credit & Fertilizer - Brazil, December, 1970.
- No. 3, Nelson, William C., Fertilizer Marketing - Brazil, January, 1971.
- No. 4, Stitzlein, John, Agricultural Mechanization - Southern Brazil, March 1971.
- No. 5, Adams, Dale W, and Joseph L. Tommy, Credit - Brazil, April, 1971.
- No. 6, Rask, Norman, and E. Wayne Denney, Rural Savings - Brazil, April, 1971.
- No. 7, Meyer, Richard L., and Donald Larson, Brazil's Program for Increasing Wheat Production, May, 1971.

- No. 8, Adams, Dale W, William Simpson and Joseph Tommy, Credit - Brazil, June, 1971.
- No. 9, Adams, Dale W, T. H. Lee and Marcia Ong, Farm Income - Taiwan, August, 1971.
- No. 10, Adams, Dale W and Chyau Tuan, Institutional Savings - Taiwan, September, 1971.
- No. 11, Rask, Norman, Richard L. Meyer, Francisco Peres, Agricultural Growth in Brazil, September, 1971.
- No. 12, Nehman, Gerald, Small Farmer Credit in Brazil, November, 1971.

### Miscellaneous

- Rask, Norman, R. L. Meyer, F. Peres, "Draft Working Paper on Agricultural Credit and Production Subsidies as Policy Instruments for PROTERRA," Department of Agricultural Economics and Rural Sociology, Ohio State University, September, 1971.
- Erven, Bernard L., and Norman Rask, "Credit Infusion as a Development Strategy, The Ibiruba Pilot Project in Southern Brazil," presented at "Small Farmer Development Strategies Seminar" held at The Ohio State University, September 13-15, 1971.
- Johl, S. S., "Agricultural Shortages and Surpluses: A Marketing Trap for the Developing Countries," Ohio State University, April, 1971.

### Publications Prepared at Cooperating Brazilian Institutions

#### Theses and Dissertations

- Valdeci Biserra, Jose, "Analise de Relacoes Fator-Produto na Cultura do Milho em Jardinopolis e Guaira, Estado de Sao Paulo, Ano Agricola 1969/70", M.S. thesis, ESALQ, Piracicaba, Sao Paulo, 1971.
- Benevenuto, Amairte, "Relacoes de Custo de Producao de Milho no Municipio de Guaira, Estado de Sao Paulo", M.S. thesis, ESALQ, Piracicaba, Sao Paulo, 1971.

#### Other

- Souza, Eli de Moraes, John Stitzlein, et.al., "Formacao de Capital e Mudancas Tecnologicas ao Nivel de Empresas Rurais -- Lajeado, Carazinho, e Nao-Me-Toque - RS," Relatoria Descritivo (Preliminary Report) 1970.
- Souza, Eli de Moraes, John Stitzlein, et.al., "Formacao de Capital e Mudancas Tecnologicas ao Nivel de Empresas Rurais -- Sao Borja RS," Relatorio Descritivo (Preliminary Report) 1970.
- Meyer, Richard L., Paulo F. Cidade de Araujo, et al., "Aspects Economicos da Agricultura na Regiao de Ribeirao Preto, Ano Agricola 1969/70" (Preliminary Report), 1971.



PERSONNEL ACTIVELY PARTICIPATING IN THE PROJECT -- 1971-1972

DAVID H. BOYNE -- Project Supervisor

1957	B.S.	Michigan State University	Dairy Science
1960	M.S.	University of Chicago	Economics
1962	Ph.D.	University of Chicago	Economics
1961-65	Assistant Professor	Michigan State University, Department of Agricultural Economics	
1965-67	Associate Professor	Michigan State University, Department of Agricultural Economics	
1967-	Professor & Chairman	Ohio State University, Department of Agricultural Economics and Rural Sociology	

NORMAN RASK -- Research Director

1955	B.S.	Cornell University	General Agri.
1960	M.S.	Cornell University	Agri. Economics
1964	Ph.D.	University of Wisconsin	Agri. Economics
1959-60	Extension Associate	Cornell University, Department of Agricultural Economics	
1962-64	Research Associate	University of Wisconsin, Land Tenure Center	
1964-65	Assistant Professor	University of Wisconsin, Department of Agricultural Economics	
1965-	Associate Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology	

DALE W ADAMS -- Professor

1956	B.S.	Utah State University	Poultry Science
1961	M.S.	Michigan State University	Agri. Economics
1964	Ph.D.	Michigan State University	Agri. Economics
1964-66	Assistant Professor	University of Wisconsin, Department of Agricultural Economics	
1966-71	Associate Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology	
1971-	Full Professor		

**BERNARD L. ERVEN -- Associate Professor**

1960	B.S.	Ohio State University	Agri. Economics
1963	M.S.	Ohio State University	Agri. Economics
1967	Ph.D.	University of Wisconsin	Agri. Economics
1967-69	Assistant Professor	University of Wisconsin, Department of Agricultural Economics	
1969-71	Assistant Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology	
1971-	Associate Professor		

**RICHARD L. MEYER -- Assistant Professor (In-Country Research Leader)**

1959	B.S.	University of Minnesota	Mechanized Farming
1967	M.S.	Cornell University	Ag. Policy and Econ. Dev.
1969	Ph.D.	Cornell University	Agri. Economics
1970-	Assistant Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology	

**KELSO L. WESSEL -- Associate Professor**

1962	B.S.	Purdue University	Agri. Economics
1964	M.S.	University of Connecticut	Agri. Economics
1968	Ph.D.	Cornell University	Agri. Economics
1968-	Associate Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology	

Participated in OSU/AID Institution Building Contract with ESALQ in Piracicaba, Brazil, 1968-1970

**S. S. JOHL -- Visiting Professor**

1952	B.S.	College of Ludhiana, India	Agriculture
1955	M.S.	College of Ludhiana, India	Agri. Economics
1964	Ph.D.	Chandigarh, India	Economics
1970-71	Visiting Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology	

Professor and Head of Department of Economics and Sociology, Punjab University, India.

DONALD W. LARSON -- Assistant Professor

1962	B.S.	South Dakota State University	
1964	M.S.	Michigan State University	
1968	Ph.D.	Michigan State University	
1968-69		Rural Sector Leader for marketing research project in Cali, Colombia.	
1969-70		Marketing Advisor to USAID Mission in Bogota, Colombia	
1970-		Assistant Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology

I. J. SINGH -- Assistant Professor

1960	B.A. (hons.)	Delhi University	Economics
1964	M.B.A.	University of Wisconsin	Production Mgt.
1965	M.S.	University of Wisconsin	Econ. Development
1971	Ph.D.	University of Wisconsin	Economics
1969-		Assistant Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology and Dept. of Economics

DAVID G. FRANCIS -- Assistant Professor

1958	B.S.	Ohio State University	Agri. Education
1960	M.S.	Ohio State University	Rural Sociology
1970	Ph.D.	Cornell University	Development Soc.
1968-70		Teaching Assistant	Cornell University, Rural Sociology
1970-		Assistant Professor	Ohio State University, Department of Agricultural Economics and Rural Sociology

JOHN STITZLEIN -- Research Associate

B.S., M.S., OSU, comprehensives completed. Returned from Porto Alegre Brazil, May 1971.

WILLIAM NELSON -- Research Associate

B.S., North Dakota State University; M.S., University of Arizona. Returned from Sao Paulo, Brazil, February 1971, and completed Ph.D. in Autumn Quarter, 1971. Currently Assistant Professor, North Dakota State University.

**JAGDEESH KALLA -- Research Associate**

B.S., University of Rajasthan; M.S., Agra University; OSU comprehensives completed. Arrived in India in March, 1970.

**ROGER BAUR -- Research Associate**

B.S., Michigan State University, 1966; M.S., Michigan State University, 1968; OSU, comprehensives completed.

**GERALD NEHMAN -- Research Associate**

B.S., Rutgers University, 1964; M.S., University of Rhode Island, 1966; OSU comprehensives completed; arrived in Sao Paulo, Brazil, March 1971.

**SOLON GUERRERO -- Research Associate**

Licentiate degree in Humanities, Universidad Javeriana - Bogota, Colombia 1963; M.S., New York University, 1970; OSU comprehensives completed. Arrived in Sao Paulo, Brazil September, 1971.

**CHOONG YONG AHN -- Research Associate**

B.S., Kyung Pook National University, Korea, 1963; M.S. University of Hawaii, 1968; OSU, comprehensives completed.

**HAGOP KAYAYAN -- Research Associate**

B.S., American University of Beirut, 1965; M.S., American University of Beirut, 1968; OSU comprehensives completed. Arrived in Sao Paulo, Brazil September 1971.

**MARCIA ONG -- Research Associate**

B.S., National Taiwan University, 1966; M.S., Southern Illinois University, 1968; OSU comprehensives completed February, 1972.

Additional faculty and staff at OSU and cooperating institutions participating with the project, including student advising, field work leadership and other activities:

The Ohio State University

Dr. Francis Walker -- Professor  
Dr. John Sitterley -- Professor

University of Sao Paulo (ESALQ), Brazil

Paulo Araujo -- Professor  
Joaquim J. C. Engler -- Professor

Federal University of Rio Grande do Sul (IEPE), Brazil

Eli de Moraes Souza -- Professor  
Atos Freitas Grawunder -- Professor  
Jose Hilario Schuck -- Professor  
Valter Jose Stulp -- Professor

Federal University of Santa Catarina

Carlos Gevaerd -- Professor

Federal University of Vicosa, Brazil

Dr. Kelly White -- Professor (Purdue)  
H. Evan Drummond -- Graduate student (Purdue)  
Dr. Helio Tollini -- Professor (on leave to the Ministry of Agriculture)

Ministry of Agriculture, Brazil

Iby Pedrosa -- Research Associate  
Fernando Curi Peres -- Enginiero Agronomo

Joint Commission on Rural Reconstruction, Taiwan

H. Y. Chen -- Marketing Specialist  
T. H. Lee -- Agricultural Economist