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# DEVELOPMENT OF THE RURAL ECONOMICS INSTITUTE AT VICOSA

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**DEVELOPMENT OF THE RURAL ECONOMICS INSTITUTE AT VICOSA**

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## DEVELOPMENT OF THE RURAL ECONOMICS INSTITUTE AT VICOSA

George F. Patrick and B. F. Jones

The purpose of this report is to assist in determining what role Purdue's Department of Agricultural Economics will assume in the continued growth and development of the Rural Economics Institute (IER) of the Federal University of Vicosa (UFV). The report presents background information on agricultural economics in Brazil, briefly reviews the progress of the IER, evaluates the current situation and delineates problems hampering future growth and development. The report is based on knowledge and experience gained by the authors while serving two-year assignments at the UFV during the period March 1967 to September 1969 and refers to development up to the end of that period.<sup>1/</sup>

The report represents a case study of one stage of the development of the IER. As such it should provide information useful to the development of agricultural economics in other universities. However, no claim is made that all information is transferable to other situations or that the report fully covers early development of the Institute.

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## BACKGROUND

All but two of the Latin American countries have one or more colleges of agriculture. In 1964, Latin America had 54 agricultural colleges which enrolled about 8,000 students and graduated 1,200 to 1,400. The curriculum is normally quite rigid and organized around agronomy. The undergraduate student has almost no flexibility in developing his own program. Programs of study in the first and second years are oriented toward math and science with some applied courses. The third and fourth years deal more specifically with agriculture. Agricultural economics, where it exists, is usually farm management. Occasionally, other courses may be available, but the undergraduate curriculum is characterized by breadth and not depth.

In 1968, Brazil had 16 agricultural colleges and 12 schools of veterinary medicine. About 5,000 students were enrolled in the agricultural colleges, an increase of 35 percent since 1964. About 1,000 agronomos were graduated, an increase of 100 percent since 1964. Although most schools in Brazil have the traditional core curriculum with only minor emphasis on agricultural economics, some schools, including the UFV, have undergraduate specialization options available to students in their last year. Flexibility is gradually being introduced into other schools. It should be noted that Latin American agricultural colleges generally are not closely associated with other colleges. Thus the school normally teaches chemistry, physics, mathematics and statistics within the college of agriculture, while social sciences are almost completely neglected.

Agricultural economics as a profession in Brazil is a recent development. In 1960, there were only about six Brazilians throughout Brazil

with M.S. degrees in agricultural economics. Until 1968 there were no Brazilians with Ph.D.'s in this profession. Prior to the establishment of the M.S. programs, a European-type doctorate program was available. This consisted primarily of self-study and preparation of a thesis with little or no formal course work. At the present time, the number of Brazilian Ph.D.'s is small, but a number of students are working toward that degree in the United States.

The largest increase in trained agricultural economists has occurred at the M.S. level. This has been facilitated by the development of M.S. programs at Vicosa, ESALQ at Piracicaba and Porto Alegre in Rio Grande do Sul. A fourth university, Ceara, in the Northeast, is currently developing an M.S. program. These represent the four Brazilian universities which have university development contracts sponsored by USAID. A professional organization--The Brazilian Society of Rural Economists (SOBER)--was established in 1958 and has served to bring together those men working on problems in agricultural economics in Brazil. SOBER publishes a professional journal which includes the proceedings of the annual meetings.

Development of a domestic graduate program has placed Brazil in the forefront of the agricultural economics profession in Latin America. The leading institution has been the Institute of Rural Economics at Vicosa. Other graduate programs at La Molina, Peru; Chapingo, Mexico; Turrialba, Costa Rica; and Castelar, Argentina are developing, but, being relatively new institutions, have not yet had a large impact on these areas.

In many respects, the demand for the services of agricultural economists has developed faster than the profession. There is a strong tendency for other Brazilian agricultural universities to develop some undergraduate specialization in agricultural economics. Government planning

agencies, banks and the extension service appear to have recognized what agricultural economists can do and have sent their own employees for M.S. level training or have hired persons who have recently completed their degrees. Formal training is largely replacing the on-the-job training of agricultural economists.

In summary, the agricultural economics profession has been established only about ten years in Brazil and has developed very rapidly. For essentially a "boot strap" organization in the late 1950's, amazing progress has been made. This growth, in large part, can be attributed to the development of M.S. degree programs and the resulting output of trained personnel. In addition to its own growth in Brazil, the profession has trained persons from Argentina, Peru and Colombia. To date, the training of personnel has received much more emphasis than research per se. The research output of agricultural economics has come primarily as a result of graduate training.<sup>2/</sup> With the increasing number of trained people, the output of research should be greater in the future.

### PROGRESS<sup>3/</sup>

The first large Purdue input into the IER began in 1958. In 1961 the graduate program was initiated. Since that time, two of the major objectives in the IER have been to:

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<sup>2/</sup> See G. Edward Schuh, Research on Agricultural Development in Brazil, Agricultural Development Council, for a discussion on the Brazil research situation.

<sup>3/</sup> For a discussion of the history and development of UFV and the IER, see the departmental paper by Schuh.

1. Develop the graduate program at the M.S. level.
2. Instill the Land Grant philosophy of teaching, research and extension.

Primary emphasis has been given to developing the graduate program by teaching courses, developing the capability of Brazilian staff in teaching and research, selecting Brazilian staff for advanced graduate study and assisting with orientation for study abroad, serving as major professors, and working with other members of the staff on thesis research. Research has been conducted primarily by graduate students as part of their thesis requirement; however, attempts have been made to develop a research program for the IER in collaboration with the Brazilian staff. Some efforts have been made to support the extension program. The Purdue professors have done almost no teaching at the undergraduate level but have assisted Brazilian professors in developing class materials. Although Purdue's direct input at the undergraduate level has been small, undergraduate program strength and development at Vicosa tends to be greatest in areas where Purdue has had a significant input in the graduate program.

Since its establishment in 1961, the M.S. program has grown rapidly. About ninety M.S. degrees have been granted and about fifteen new students are admitted each year. In 1968 an M.S. program in extension was initiated under the administration of the IER. This program admits about ten students each year. Although several are nearing completion, to date none of the people in the extension program have completed their M.S. degrees. The following table indicates the progress made by the IER.

Table 1. Graduate Enrollment and Record of Completion, IER, Vicoso, 1961-1969.

Year	Students Enrolled	Completed Courses	Completed Thesis
1961	11	11	10
1962	11	10	8
1963	16	14	11
1964	11	10	8 (+2)
1965	19	15	12 (+2)
1966	18	16	12 (+2)
1967	17	(15)	(12)
Ag. Econ. 1968	15	14	(2)
Ag. Econ. 1969	15	-	-
<b>Total: Ag. Econ.</b>	<b>133</b>	<b>(105)</b>	<b>(88)</b>
Extension 1968	10	9	-
Extension 1969	10	-	-
<b>Total: Extension</b>	<b>20</b>	<b>9</b>	<b>0</b>

Note: Numbers in parentheses are approximate.

#### PRESENT SITUATIO

Rapid growth and the development of a strong M.S. program since 1961 characterize the IER. Yet there are many problems to be solved. This section reviews the present situation with respect to staff, teaching (both graduate and undergraduate), research and extension and briefly indicates some problem areas.

### Staff

The staff of the IER had a high turnover rate since 1961. Of three Brazilians originally in the program, two have left the University, one to work for the InterAmerican Development Bank in Washington, and the third is presently President of the University. Many young staff members have been recruited from the M.S. program. Many were selected for the staff after completing their B.S. degrees and allowed to pursue their M.S. degrees while working part time. All but two of the present staff have received or are working on their M.S. in the IER. The improvement of the professional capability of the staff has been impressive.

In addition to training at the M.S. level, several staff members have been sent to the United States for Ph.D. level training. Of the first group of three in 1961-62, only two completed the Ph.D. and none returned to the IER.<sup>4/</sup> The second group of four has had a much better record. One completed his Ph.D. in rural sociology at Wisconsin and is now Director of the IER. One completed his Ph.D. at North Carolina and returned to the IER in September. Two went to Purdue, completed prelims, returned to Brazil and worked two years, then returned to Purdue to complete degree requirements. One is now back in Vicosa and the other will be returning shortly.

In addition to these two groups, one more man is presently enrolled at Purdue. A second man will be going to Purdue in January 1970. With the establishment of the Extension M.S. program, one man went to the University of Texas for M.S. level work in communications. His fellowship was for one

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<sup>4/</sup> It should be noted that the objective of the Purdue-Brazil Project, at that time, was not limited to training of Brazilian staff solely for the URENG.

year and was not renewed. He returned to Vicosa in September 1969 without his degree but with sufficient progress that completion is expected.

The following people are currently staff members of the IER.

Roster of Brazilian Staff

<u>Staff Member</u>	<u>Degree</u>	<u>Area</u>	<u>Work</u>
1. Fernando Rocha	Ph.D. (Wisc.)	Director of IER	Director of the IER is nearly a full-time load. In addition, he teaches both graduate and undergraduate courses, but has had very little time for research.
2. Euter Paniago	Ph.D. (Purdue)	Prices	Recently returned to IER and has taught graduate courses.
3. Helio Tollini	Ph.D. (North Carolina)	Statistics, Econometrics, Farm Manage- ment	He returned to the IER in September and has not yet been integrated into the program.
4. Antonio Teixeira (now in U.S.)	Ph.D. (Purdue)	Production Economics, Economic Theory	He was director of the IER before returning to the United States and also taught graduate courses.
5. Tulio Barbosa	Working on Ph.D. (Purdue)	Land Eco- nomics, Agrarian Reform	He has taught graduate courses. He should complete his degree in 1972
6. Evonir Batista de Oliveira	M.S.	Production Economics	He has a Ford fellowship for Ph.D. study at Purdue beginning in January 1970. He has taught Prod. Econ. at the graduate level and Econ. Theory at the undergraduate level. He should return about 1974.

Roster of Brazilian Staff (cont.)

<u>Staff Member</u>	<u>Degree</u>	<u>Area</u>	<u>Work</u>
7. Josue Leitao e Silva	M.S. (UREMG)	Farm Management	He has taught undergraduate courses but not graduate courses.
8. Luis Moura	M.S. (UREMG)		He is classed as a researcher and has taught some at undergraduate level.
9. Miguel Ribon	M.S. (UREMG)	Farm Management	He does some undergraduate teaching and contributes to the M.S. research program.
10. Antonio Fagundes	M.S. (UREMG)	Economic Theory and Marketing	He is doing some graduate and undergraduate teaching and contributes to the M.S. research program.
11. Eloy Gava	Working on M.S. in Extension (UREMG)	Extension	He has done some undergraduate teaching, but works primarily in extension
12. Francisco Machado	M.S. course work (U. of Texas)	Extension	He returned to Vicosa in September 1969 and no information is available on his present activities.

By early 1970 the IER should have four staff members with Ph.D.'s and two studying in the United States. If additional men are to be trained at the Ph.D. level, they must be recruited from present graduate students or from those currently working for other organizations.

In addition to the staff members listed above, the IER utilizes some other men on a part-time basis. Fabio Gomes (Ph.D.) and Raymundo Nonato (M.S.) assist in the area of statistics. J. Aleixo (M.S.), director of the ABCAR training center, teaches the graduate farm management course. About six students are on half-time assistantships in the IER. They cannot teach

undergraduate courses, but assist in the preparation of materials, etc., and in the research program. Lacking a tradition of graduate assistants, this part-time staff has not been utilized to the greatest extent possible by the Institute in both teaching and research.

The staff of the IER, in addition to their own graduate and undergraduate courses, also teach some courses in the Schools of Forestry and Home Economics. The IER has primary responsibility for the U.S. program in extension and teaches some of the courses. However, they also utilize some professors from outside the University and from the ACAR training center. Only one course was added especially for the Extension M.S. program as these students take courses jointly with the students in agricultural economics and other departments.

A summary of the approximate time distribution of the IER staff is presented in Table 2.

### Teaching

Undergraduate teaching has been done entirely by the Brazilian staff in recent years. One of the major difficulties is that the high turnover in staff requires a greater than normal amount of time for preparing teaching materials. If professors taught the course more than once the amount of total effort in undergraduate teaching could be reduced. This situation should improve if staff turnover can be reduced.

One of Purdue's contributions to the undergraduate program has been the concept of undergraduate specialization. This started at the UFV and is spreading to other Brazilian institutions.

Table 2. Summary of Current IER Staff Input\*

Input	Teaching		Research (man eq.)	Extension (man eq.)	Admini- stration (man eq.)	Total Man Equivalents (man eq.)
	Under- Graduate (man eq.)	Graduate (man eq.)				
Ph.D.'s - 3 Brazilians	.15	1.32	.93	0	.60	3.0
Ph.D.'s - 2 Americans		1.00	1.00			2.0
M.E.'s - 5	1.80	.75	2.05		.40	5.0
Other - 1	.20			.80		1.0
Half-time Assistants - 7	1.75**		1.75			3.5
Totals	3.90	3.07	5.73	.80	1.00	14.50

\* This does not include the input of Teixeira or Machado, but does include Lon Cesal and Kelley White.

\*\*

Some modifications in course offering are being made to reduce the amount of repetition and make courses more relevant. In general, the undergraduate teaching program is running quite smoothly. Purdue's recent input has been small and should probably continue at about the same level. The input consists primarily of ad hoc advising with individual teachers and some work on curriculum development. Purdue's contribution to training of staff members at the M.S. level has improved the quality of undergraduate teachers and strengthened the undergraduate program.

Graduate teaching has been one place of major Purdue emphasis.

Through June 1969, the following courses were taught by Americans:

Rural Sociology	2 semesters
Resource Economics and Policy	2 semesters
Production Economics	7 semesters
Economic Theory	4 semesters
Marketing	3 semesters
Research Methodology	7 semesters
Community Development	2 semesters
Econometrics	<u>1 semester</u>
Total	28 semesters

The M. S. level courses taught and hours of credit are presented below.

A "B" following the course indicates it is being taught or will be taught by a Brazilian in 1970.

First Semester

Economic Theory	(3)*	B	
Research Meth.	(3)*	B	
Statistics (I)	(3)*	B	
Farm Management	(3)**	B	
Agr. Prices	(1.5)	B	
Extension Methods	(3)	B	(Ext. M. S.)
Economic Theory for Extension	(3)	B	(Ext. M. S.)

Second Semester

Production Econ.	(3)*	B	
Statistics (II)	(3)	B	
Rural Sociology	(3)	B	
Marketing	(2)		
Econ. Develop.	(3)***		
Agrarian Reform	(3)***		
Extension Methods	(3)	B	(Ext. M. S.)

\* Required.

\*\* Required for those not graduating from UFV.

\*\*\* These courses have been taught by visiting professors (non-Purdue) and change from year to year. Community Development and other courses have been offered at various times depending upon special interest and availability of professors.

To a great extent, the Brazilian staff has taken over the major part of the teaching load at the M.S. level. Marketing is one area where Brazilian expertise is currently limited. Greater support needs to be

given to this area. With the return of Tollini and Teixeira, the other courses to be offered during the second semester should be staffed by Brazilians. However, there are still some inadequacies in the U.S. program. The emphasis on macro economics and policy need to be strengthened. These are the areas in which most of the graduates are working after graduation.

### Research

In large part, the research program has been carried out through Master's theses. The 64 theses completed through 1967 have been classified as:

Cost of Production	7
Production Function	22
Marketing	7
Consumption Economics	3
Farm Management	9
Sociology	7
Macro-Economics and Planning	4
Agricultural Credit	2
Land Tenure	2
Forestry Economics	<u>1</u>
	64

The "mix" has changed little in recent years. A list of the theses that have been completed is presented in Appendix A.

These research projects have been supported by a variety of Brazilian organizations such as ACAR-Goiás, CODEVALE, IBRA, SUNAB, CEPLAC, State Secretariat of Agriculture and some banks who have employees in the U.S. program.

In addition to graduate theses research, the IER has three other major research projects:

1. Production and marketing of milk in the Goiana milkshed. Funded in 1967, this research was completed in early 1969 for ACAR-Goiás. Results were published as an extension bulletin (marketing) and a thesis (production).
2. On-farm storage of grain in Southern Brazil. Funded in 1967, the major research effort was completed in 1968. A pilot storage project is to be started in one area, but IER has little responsibility. This project was funded by the National Development Bank and the results were presented to them. Results have not been released for general publication.
3. Economic Development of the Zona da Mata (Forest Zone). Funded in 1969 by IPEA (Ministry of Planning), this is a three-stage project studying the geographic region in which Vicosa is located. The first stage, now completed, consisted of preliminary surveys of minicipios selected from the 123 located in the forest zone of Minas Gerais. Farmers, bankers, industrialists and commercial interests were surveyed in an effort to identify trends under way to define specific researchable problems. The second stage will be 10-12 M.S. thesis projects. These projects will be designed to study in depth the identified priority problems. The third stage will be a joint staff effort to bring together the results in a comprehensive report on employment alternatives, investment opportunities, development possibilities and needed resource adjustments in the heavily populated, limited resource forest zone.

The staff of the IER recognizes the present inadequacies of the research program and is attempting to improve it. Schuh<sup>5/</sup> has evaluated the research output and highlighted three weaknesses of the program:

1. Lack of a program which attacks the problem of the state and nation in a systematic manner.
2. Failure to integrate the results of a number of studies into larger pieces of analysis.
3. Many studies which are not relevant or fail to attack important problems of Minas Gerais and Brazil.

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<sup>5/</sup> Schuh, G. Edward, Research on Agricultural Development in Brazil, Agricultural Development Council, pp. 79-80.

These weaknesses are largely the result of inadequate staff and financing. However, the IPEA research discussed above is a significant step toward an integrated research effort. This project does represent a coordinated attack on problems of the region in which the University is located and gives the IER the opportunity to make a substantial contribution to regional development.

In general, state funds have not been available to support a research program. Traditionally, Brazil has not considered research a function of the university, although various attempts dating from 1948 have been made at Vicosa to bring the research function within the university structure. The reorganization of the University in 1965 placed the outlying state research units under the administration of the University Research Director. However, in 1966, a change in the state administration resulted in the negation of this administrative shift.

Faced with lack of state funds, the IER has had to seek support from other organizations in Brazil. They have successfully attracted research funds from a number of sources. However, funds are usually earmarked for very specific projects and/or geographic areas. Often these funds are available only on a short-term basis or become available at the last moment. For example, in late 1965 contact was made with SUNAB for research support. The SUNAB budget for 1966 had already been committed and no money would be available until 1967. However, during this period the IER staff member who had contacted SUNAB left and no one realized funds were available until late 1967. Projects had to be developed and the money spent by December 31, 1967, or the funding would have been lost. The funds were used, but entirely on an ad hoc basis that contributed very little to the overall development of the research program.

Another source of research funds has been employers of the graduate students. Although these funds have alleviated the problem of student support, they have normally been used for projects of interest to the employer and not projects that would contribute to an overall research program.

The high turnover of Brazilian staff and general shortage of personnel have contributed to the funding difficulties. Long-run staff improvement efforts have taken priority over research. Several of the outstanding Brazilian staff who could identify relevant problems and solicit support have been sent to the United States for Ph.D. level training. Those remaining have been extremely busy with teaching and current research endeavors and have not been able to develop projects to solicit additional research funds. It has been generally true that the IER has been asked to study problems of particular interest to the funding organization rather than to identify priority problems for the region and solicit the needed support. Therefore, some of the more relevant problems have remained unresearched. Staff inexperience and the funding pattern just described have resulted in continued work on a narrow spectrum of problems utilizing similar methodologies.

The length of assignments for Purdue personnel at the UREMG has also contributed to the limited development and restricted scope of the research program. The 'new' staff member has assisted in research and devoted major effort to research through graduate students. However, until he becomes better acquainted with Brazil he cannot assist greatly in identifying relevant, important problems. By the time the Purdue staff member is sufficiently familiar with Brazil, he is scheduled to return to the States. Thus, he

does not make as great a contribution to the development of a research program as he could given a longer term assignment.

In summary, lack of research tradition coupled with lack of continuous financing, high staff turnover and shortage of staff have led to a research program which has performed the training function reasonably well, but has not contributed greatly to the solution of the problems of Brazil.

The study of economic development of the Zona da Mata financed by the IPEA grant provides the opportunity and challenge for developing an overall research program. Staff members have been forced to look at different types of problems and research methodologies and consider the integration of results from a number of studies. At the same time, longer term financing is available to support part of this type of program. It is anticipated that successful completion of this study will lead to a continuing relation with IPEA. IPEA's breadth of research interests and the probability of continued funding should motivate the IER toward a better balanced research program.

The return of the new Ph.D.'s should provide additional leadership for development of a program which attacks the relevant, important problems. These men should be of great assistance in identifying problems, have a broader knowledge of appropriate methodologies and aid greatly in soliciting funds.

Improvements have also been made in the manner of administering research grant money.

1. Channels are developing
2. Concept of "overhead" is being instilled.
3. Professors can receive salary supplements from research funds.

### Extension

The extension function of the IER is the least developed area of activities. The State Extension Service, ACAR, is not administratively a part of the University and direct extension contact with farmers is largely outside the area of activities of the University. The University does hold an annual "Farmers' Week" at Vicosa and in other areas of the state, and professors present lectures or demonstrations. One man in the IER is supposed to devote full time to extension activities as an extension specialist. However, the man is also enrolled in the Extension M.S. program and teaches part time. Another man was in the United States and has recently returned to Brazil. Little is known of his present activities.

It is recognized that both of these men would benefit from additional training in agricultural economics. However, before the extension program can be most effective in providing a substantial service to the agricultural sector, the role of the University in extension must be evolved and the proper activities of extension more precisely defined. The extension specialists in the IER could work closely with ACAR in providing meaningful economic analysis of new programs and/or practices before they are recommended to the farmers.

A serious weakness of the IER program is the great lag in publishing research results as either research or extension bulletins. Much of the useful information that has been obtained from the research program is not available to extension agents or farmers. Again, the extreme shortage of staff with great demands on their time has contributed to this problem. Another contributing difficulty is the very extensive (and slow) review

process. Even after a bulletin is approved for publication, the printing process can delay its release.

The Extension M.S. program is another area of activity of the IER. This program was initiated in 1968 and has enrolled about ten students per year. Although administratively controlled by the IER, the Extension M.S. program has as its main promoter and supporter the ABCAR training center located at the University. The teaching load of the IER for the extension program (discussed previously) is relatively light; however, the IER is supplying the major share of the research supervision.

The Extension M.S. program has experienced some growing pains in attempting to discover and establish its appropriate niche in the agricultural structure of the IER. In large part, this is again due to the ambiguity of the defined role of extension in the overall program of the University. The future of the program is very indefinite. Provided with more positive direction of its efforts and strong leadership, the extension program could be complementary to the IER and have substantial impact on the development of a comprehensive teaching, research and extension program.

#### University Outreach

The recent USAID evaluation team raised some serious questions regarding the effective outreach of the UFV. While the exact meaning of "outreach" is not clear, a few comments appear appropriate.

As previously stated in this report, the University has been through a very adverse financial period during the past three years the effects of which have been pervasive. This has affected salaries, both as to level and time of payment, manpower and morale. Struggling simply to remain a viable institution has taken its toll on some activities. Also, less effort

on the part of Project staff has probably been required at certain governmental levels than during the period around 1964-65 when the University underwent its previous reorganization. During that period, Purdue personnel, particularly Professor McDermott, were active at various levels of government in soliciting University support. Having gone through that period, support was good until the change of state government in 1966. Since then, meaningful contact at the state level has been difficult.

Two types of outreach are quite evident. A continuing effort has been exerted to build and maintain linkages with the various state and federal organizations that play a role in the development of the UFV. These include the State and Federal Extension Service in Vicosa, the State Extension Office in Belo Horizonte, the Cocoa Institute in Bahia, the State Extension Service in Goias, the Ministry of Planning in Rio, the State Secretary of Agriculture Office in Belo and, more recently, the Economics and Statistics Section of the Ministry of Agriculture. These linkages consist of consultations over research problems, data sources, research contracts and supervision of graduate student research within the various entities.

A second type of outreach is through the students who come to Vicosa. As stated elsewhere, almost all M.S. candidates come from various organizations, are supported by them and return after the degree is obtained. Students have been sponsored by the Extension Services in Minas Gerais, Goias, Mato Grosso, Espirito Santo, State of Rio, the Secretaria in Belo Horizonte, Bank of Brazil, other banks, the Federal University of Ceara, the Federal Land Reform Agency, Federal University at Km. 47 and others. Students also come from at least four countries outside Brazil.

The above is not to suggest that all has been accomplished that could have been. Rather it is to indicate that some of the recent implied criticism has not been justified.

With expanded resources it is possible for the IER to think about a new dimension of outreach which might include more direct work with other Brazilian universities.

#### FUTURE

The present USAID contract with Purdue is scheduled to terminate in 1971. If the contract is allowed to expire, it is difficult to predict future development of the IER. If the University's financial situation is stabilized and adequate funding is made available on a timely basis, the IER probably has sufficient momentum to continue and strengthen the M.S. program. This assumes that salaries will be sufficiently attractive to hold the present staff and to induce professors currently studying for the Ph.D. to return to Vicosa. Even a partial loss of the six programmed Ph.D.'s will represent a serious set-back to the development of the IER at Vicosa.

Given the current changes underway in Brazilian higher education, which includes official recognition of Ph.D. level study, it is possible that a Ph.D. program would be started at Vicosa even if Purdue were to depart from the scene. In view of subsequent observations, its successful initiation would be dependent to a large measure on outside assistance. However, it is possible that another U.S. university would be attracted to Vicosa if Purdue were to pull out. The ground work is there for a Ph.D. program and someone is likely to capitalize on the past success of the Purdue/Brazil Project.

Although the contract is due to terminate in 1971, current interest suggests that Purdue will continue to be involved in some type of program at the UFV. The following have been considered as possibilities for the area of agricultural economics:

1. Start Ph.D. program at Vicosa.
2. Develop a bi-national vegetable protein center with an agricultural economics input.
3. Develop an agricultural policy institute as conceived by Dr. Schuh.
4. Work with the UFV to help develop another Brazilian university.

Each of the above possibilities involves multiple objectives and associated resource requirements. It is not the purpose of this paper to discuss these objectives in detail or specify the required resources. However, it is important to recognize the problems pertinent to each or all of these possibilities. If the IER decides to pursue one or several of the above alternatives and to continue in the forefront of the profession in Brazil, workable solutions to these problems must be found.

The following list of problems are, or will be, only partially under control of the Agricultural Economics Department at Purdue. Other problems are in Brazil at the department, university, state and federal level. A discussion of these problems, regardless of the level where a solution must take place, will show the environment in which future development will occur. The nature of the solution to these problems can have a profound impact on the type of program that Purdue can develop.

## Problems and Opportunities

### Staff

#### 1. Brazilian inputs

- a. Increase number of staff. The present staff will be barely adequate for continuing the M.S. program at present or slightly expanded levels. An effort must be made to refill the staff pipeline since a successful Ph.D. program would eventually require a resident staff of 10-15 full-time Ph.D.'s. The possibilities of training all of the present staff to the Ph.D. level are quite limited. Furthermore, the graduate student group does not provide a major source of staff candidates since many M.S. students are already committed to employment in their sponsoring institutions after receiving their degree. An exception is the current Ford scholarships (half-time assistantships) which represent an effort to attract potential staff by making it possible for students without employment commitments to do graduate work. More of this kind of scholarship opportunities must be made available.

The IER recruits principally on the basis of its general academic environment and the opportunity to obtain Ph.D. level training. However, salary is becoming more important. Recruiting should be continuous since the IER, as a leader in agricultural economics, will be subject to the 'brain drain' for some time to come.

In order for the IER to build staff, particularly if a Ph.D. program is started, it may be necessary to raid other institutions to regain former staff members and students which it has trained

since 1960. There are indications that some previous students would be interested in returning if the salaries were reasonably competitive and paid on time. These people represent a source of both Ph.D. students and potential staff.

- b. Quality and staff improvement. Development of a Ph.D. program will require training at the Ph.D. and post-doctoral level outside of Brazil, probably in the United States, for some time to come. The degree of inbreeding in the current UFV staff, as well as the number of Purdue graduates on the staff and in Brazil, indicates that broader exposure of future staff members is essential. Staff improvement will need to take place largely through training of new staff.

Marketing is the weakest area at the IER. Purdue input into this area has been small and ad hoc. As a result, Brazilian staff have not been attracted to work in the area. However, many Brazilians recognize that marketing is a major problem in agricultural development. The institutional orientation which marketing research and teaching should probably take in Brazil, at this point in time, requires Brazilians working in the area or a long-term American input.

2. American inputs - Barriers to recruitment and successful functioning.
  - a. The problem of education of one's children while serving two to four years in Vicosa cannot be overemphasized. Since staff members with the highest probability of success on the Project also tend to have children of school age, a more satisfactory solution to this problem must be found if a substantial American input is to continue in Vicosa. A system similar to our old eight-grade country school

with one or two teachers could be better than the present home teaching system. Another alternative would be employing one or two staff wives to supervise teaching by correspondence. This would eliminate some of the burden on mothers and would enable them to take a more active role in the University community.

- b. Young staff members are concerned about professional development and opportunity to do research resulting in manuscripts acceptable to North American publishers. This could be partly overcome through greater use of full-time or half-time U.S. research associates. The argument has been made that we are in Vicosa for university development and not research per se. This is only partly correct and appears to be changing. Combining an experienced staff member with a research associate would permit research output as well as work toward university development. Capable research associates increase the productivity of the experienced staff, are well accepted by young Brazilian staff and can make an important contribution to the program at Vicosa and the research output concerning Brazil. USAID has not looked with favor on the use of research associates. Apparently, this is because of manpower limitations and difficulties in recruitment. We believe the latter is largely a problem of funding since post-prelim students could be recruited given sufficient lead time. For the student, the research associate position is an excellent professional opportunity to serve as an apprentice with an experienced staff member and gain international experience.

### Salaries

1. IER salaries must be competitive with other Brazilian institutions. Family ties to Vicosa of present staff and the academic environment partly compensate for lower salaries. Attainment of graduate degrees are breaking down these former ties and mobility will tend to increase. Salaries must be made sufficiently attractive to enable the IER to recruit staff members from other areas and hold current staff.
2. Presently almost all staff of the same rank receive the same salaries. Salary supplements individually obtained from outside sources often bear little relationship to capabilities and contribution. A more discriminating system needs to be developed. A more flexible system of hiring and a system of promotion related to individual productivity also must evolve.

### Administration

1. The department head needs greater power and flexibility over use of funds. It is not known whether current reorganization of the University will permit more control at the department level or not, but this is becoming more essential as contract research funds are becoming available. However, this does not preclude closer coordination of research funds through the office of the University Director of Research.
2. University rules now permit salary supplementation. The use of contract research funds as a part of the total salary money to pay current staff and create new positions needs to be further developed.

3. Teaching assistants need to be utilized more fully and effectively. Present rules of the Ministry of Education may make this difficult, but alternatives should be tried.
4. The Director of the IER utilizes committees for research, extension, teaching and library development. However, he is often saddled with excessive minor decision-making. Perhaps a more informal committee structure coordinated by assistant directors could make coordination more effective. Particularly, it would be desirable to consider establishment of an assistant director position having responsibility for guidance of the Institute research program.

#### Teaching

1. As indicated above, the M.S. program is still short of manpo. Marketing in particular needs further development. Teaching and research in the marketing area should have an institutional orientation. Emphasis should be on understanding the various marketing functions and describing the marketing channels through which goods flow from the producer to consumer. At this point it would be inadvisable to initiate a highly computer-oriented, business-management type approach to marketing.
2. If the Ph.D. program is started, course offerings will need to be broadened to include more economic theory, money and banking, macro economics and more quantitative methods. Presently there is almost no back-up staff in the statistics area. A more complete study of the curriculum will be needed prior to starting a Ph.D. program. In addition to the current Purdue staff at Vicoso, it may be advisable to have another experienced person on a short-term basis to advise in this area.

3. Consideration should be given to the use of short-term American professors for teaching certain courses on an intensive basis. The problem of language needs to be considered as use of translators should be kept to a minimum. Sending American or other professors to Brazil appears to be preferable to bringing students to the United States for course work. However, training in English should be an integral part of the Ph.D. program, particularly if men are sent to the United States as post-doctoral fellows for broadening experiences.

### Research

1. Continuity of funding. The above discussion should illustrate the importance of a steady, dependable source of funds for development of a research program. Grants can and should be solicited but it should not be necessary to depend on these sources alone. Because of past dependence on contract funds, the IER has tended to accept much of what comes along out of necessity. Today the Institute has obtained sufficient stature to permit it to be more selective and make some stipulations of its own, e. g., overhead should be built into contracts. Part of this overhead could be used by the University Research Director of the IER for support of research in areas where contract funds are more difficult to acquire. Some of this money should be used for new staff positions and graduate assistantships, particularly for potential staff.
2. Breadth of research. There is a lack of aggregate studies in contrast to farm firm analysis. Inadequate attention has been given to the past effects of government policies on agricultural growth, e. g., pricing, foreign exchange policies, tax policies, rural education policies.

Shortage of good aggregate data undoubtedly has been a restricting factor but opportunities may be opening up for improvement of quality and access to data.

3. The geographic areas researched have been too small. This is probably due to lack of travel funds coupled with the poor road system. There is a need for more studies of commercial agriculture as opposed to subsistence agriculture.
4. There is a need for more forward-looking research using budgeting, linear programming and simulation. The notion of engineering-type studies does not draw much enthusiasm. This may be due to past "fabrication" of data which led to little useful and/or dependable results. In any case, it is necessary to do more evaluation of alternatives for the future and fewer studies of history.
5. Publication and distribution of research results lags. Improvement in this area would aid in building long-run support for the University.
6. Employment of full-time researchers. Although the Institute has had full-time researchers, only one is currently on the staff. Development of a research program will require at least two or three persons with essentially full-time research responsibility. This is possible within the current university structure but shortages of funds have caused reduced spending which has been accomplished by leaving positions unfilled.
7. The IER has been slow in developing a meaningful linkage with the office of the University Director of Research. Establishment of this linkage is essential for the development of a research program. The Research Director could probably be a protector of funds for IER use.

### Extension

1. The role of the extension specialist apparently is currently being redefined with reorganization of the University and the extension center at Vicosa. If the extension component of the IER is to be effective, it will be necessary to provide more staff training with emphasis on agricultural economics.
2. The delay in publication must be shortened. There is also need for more interpretation and application of research results.

### Library

1. Although the IER library has been acquiring many books, more books and other library materials will be required as the M.S. program expands or a Ph.D. program is started. Purdue can contribute by continuing to make suggestions for acquisitions of English language books.
2. The IER is subscribing to an increasing number of professional journals. Purdue may be able to supply missing volumes of some journals. Purdue should also send copies of all theses dealing with Brazilian subjects to IER. This has not been done consistently in the past. Appendix B of this report lists the work completed at Purdue and also that currently underway. This list shows a substantial amount of work completed with considerable breadth of subject matter.
3. When the new University Library at the UFV is completed, it may be desirable to integrate the IER holdings into the University Library.

This would reduce the input required by the IER to maintain its own library and provide professional library assistance.

4. If Purdue continues its involvement in Brazil, the library acquisition program at Purdue should be strengthened substantially. Purdue is currently receiving very little of the material being published in Brazil.

#### Extension M.S. Program

The future of this program has not yet been well defined. The program must continue to seek ways of becoming more complementary with other programs in agricultural economics.

All of the factors limiting the agricultural economics program of the IER also affect the Extension M.S. program. The problems of staff and research money are even more severe. At present, the program is restricted by limited manpower. To date, the Purdue input has been very small.

Careful evaluation of the potential contribution of the program should be made and the possibility of a non-thesis program considered. Perhaps the most effective type of program would include training through the M.S. level courses in a particular area plus additional courses in extension. Thus, an individual would have the M.S. course work in, say animal husbandry, and additional training (three to four courses) in communications, extension methods, etc. This would increase his capabilities to perform a role similar to that of a U.S. extension specialist. This would place greater emphasis on subject matter competence to be supplemented with sufficient training in educational and extension methods.

SUGGESTIONS AND RECOMMENDATIONS

A suggested objective for continued Purdue involvement in the IER is establishment of a viable Ph.D. program at Vicosa. Previous discussions had indicated that this is a legitimate activity of the Department of Agricultural Economics at Purdue, within our scope of expertise and important to Brazil. Given the problems discussed in the previous section, it is imperative that careful thought be given to the initiation of this program. To assure success it is recommended that continued strengthening and expansion of the M.S. program be carefully coordinated with the initiation of the Ph.D. program.

Assuming the present USAID contract is not renewed after 1971, the bi-national vegetable protein center (V.P.C.) is a means by which Purdue could continue to maintain professors at the IER. The V.P.C. contract is more research oriented than the present contract. This would allow strengthening of the research program of the IER. The money available through this contract could possibly be used to add staff and form a nucleus of the research program.

During the next two to three years it is essential to recruit staff members to continue to strengthen the M.S. program. Additional courses should be added as manpower becomes available, both to supplement the M.S. program and begin the Ph.D. program course work. Selected individuals on the staff should be encouraged to take these additional courses with the idea that they could be the first Ph.D. class. It does not appear possible that all of the Ph.D. program courses can be taught by Brazilians for some time, but they can teach many of the basic courses.

A possible means for obtaining the other courses necessary for the Ph.D. program is the use of short-term (three month) American professors or professors from other Latin American institutions. Six to nine hours of course work (or more) could be offered per year in this manner. It appears that an explicit institution-building contract (USAID or Foundation) should be obtained to permit this type of arrangement. The use of professors on a short-term basis could reduce the U.S. input in the program. It would be desirable, however, to have additional Purdue staff in Brazil on a more permanent basis.

Establishment of a policy research institute at Purdue could contribute directly to both the V.P.C. and Ph.D. program. One of the advantages of such an institute is that it might provide an administrative means of allowing staff with an interest in the international area to devote part time to this interest on a more or less continuing basis. People associated with the V.P.C. in Brazil or at Purdue could also form part of the Institute. It might be possible to utilize American Ph.D. students at Vicosa and the staff members could also work with Brazilian students in Vicosa. The policy institute would allow part-time use of men who had gained experience in Brazil to continue working on Brazilian problems of interest without spending additional extended periods of time in Brazil. It should allow persons without international experience to gain experience and work in the area if they have an interest.

One of the apparent advantages of establishing a policy institute for the development of the Ph.D. program at Vicosa is that it offers possibilities of reducing the Purdue input required for the program. Experienced men can be utilized on a part-time and short-term assignment basis--this is very difficult under the present USAID contract.

The V.P.C. contract appears to offer a means of supplementing Purdue's contribution to the program, particularly in the research area. While not being the entire basis of the research program, it should provide a nucleus for both basic and applied efforts. Since all of the envisioned projects are oriented toward attainment of a general objective, projects should be designed so that they can later be integrated to draw more comprehensive conclusions. This needed coordination should provide good experience for the Brazilian staff and give insights to larger problems.

Once the Ph.D. program is started at Vicosa, it will be difficult to send men to the United States for Ph.D. training without inferring that the Brazilian program is of lower quality. However, it appears essential that the Ph.D.'s developed in Brazil receive exposure to other schools of thought and to the U.S. environment. As a means of preventing some of the problems of inbreeding, consideration should be given to sending persons to U.S. universities on post-doctoral programs. As indicated previously, training in English should be an integral part of the Ph.D. program, not only to facilitate the post-doctoral programs, but also to allow the people to maintain contact with new developments in the profession.

Financing for these post-doctoral programs may be somewhat difficult to obtain. On the other hand, the recent stress on advanced training by the Brazilian Government may mean that resources will be available for this type of program.

It is anticipated that, during the first couple of years, many of the students in the Ph.D. program would be IER staff members. However, in later years, other universities and institutions will no doubt want to have people trained at the IER. To avoid problems, particularly in the research

area, which have occurred in the M.S. program, a definite research program should be developed. It will probably be necessary for individuals to return to their respective organizations after completing their course work. Here the V.P.C. contract may provide sufficient breadth to allow an individual to return to his institution and continue working on a project that will truly make significant contribution to the research program of the IER.

### CONCLUSIONS

The IER has achieved tremendous progress during the past ten years. Many problems have been solved and others are being solved. During 1968-69, the IER may have turned a corner. In 1968, a top-notch M.S. program without Purdue support was clearly impossible. However, the return of men having Ph.D. training from the United States has now reversed this situation. The teaching and research program have been greatly strengthened. With reasonable luck with respect to financing, the IER can continue to grow and further enhance its reputation as a leader in agricultural economics. In many respects, the IER has reached the point of increasing returns. The original objectives of developing a viable M.S. program and instilling the Land Grant philosophy are nearly accomplished.

Establishment of a Ph.D. program at Vicosa will require substantial inputs and a long-run commitment of from five to ten years. However, the returns to this type of investment appear very high. These returns will accrue not only to Vicosa, but also to the State, Brazil and much of Latin America. Although this report may appear pessimistic in spots, it has attempted to provide a realistic evaluation of the situation and problems.

The progress that has been made may be more difficult to see, but it has been very real and it will continue.

APPENDIX A

M.S. THESES COMPLETED AT THE UFV IN AGRICULTURAL ECONOMICS

1. Junqueira, Antonio Augusto Botelho; "Economic Analysis of a Production Function - Tobacco in Uba, M.G., 1961," 1961.
2. Brandao, Filadelfo; "Contribution to the Study of Ballast and its Implications in the Maximum Space Utilization in Warehouses," 1962.
3. Fontes, Fernanda Nogueira; "Study of Consumption by Families in Vicoso, Minas Gerais."
4. Pereira, Geraldo; "Agricultural Exploitation System, Cost and Corn Production Cost Relationships in Capinopolis, M.G.," 1963.
5. Souza, Joaquim Aleixo de; "Study of Agricultural and Livestock Enterprise Combinations, Uba, M.G.," 1965.
6. Moura, Luiz Maria de; "Impacts of Technological Changes on Dairy Cattle Production and Income in Vicoso, M.G.," 1963.
7. Primo, Olegario Rodrigues; "Production Cost Relationships in Capinopolis, M.G.," 1962.
8. Bemelmans, Paul Frans; "Corn Production Cost in Vicoso and its Economic Relationships," 1964.
9. Silveira, Pedro Hudson de Paiva; "Analysis of the Relationships Between Capital Structures, Usage and Agricultural Credit Sources," 1963.
10. Machado, Renato Rodrigues; "Rural Property Inheritance and Small Estates in Vicoso," 1962.
11. Rocha, Fernando Antonio da Silveira; "Connections Between a Rural Social System and Other Social Systems - Zueira, Uba, 1962," 1964.
12. Teixeira, Antonio Raphael Filho; "Marginal Productivity Analysis of Agricultural Resources in two Municipios of the State of Minas Gerais - Ituiutaba and Caratinga, Agricultural year 1961-62," 1964.
13. Cunha, Hilton; "Multivariate Analysis of Non-Irrigated Rice Production Costs," 1964.
14. Tollini, Helio; "Marginal Productivity and Resource Usage; Milk Production Function Analysis in Leopoldina, M.G.," 1964.
15. Paredes, Carlos Ivan Petersen; "Onion Production Cost Relationships in Santo Antonio do Gramma, M.G.," 1964.

16. Silva, Jose Zeferino da; "Capital Structure and Formation Analysis in Ituiutaba and Capinopolis, M.G.," 1963.
17. Silva, Josue Leitao e; "Milk Production Cost Economic Relationships in Three Municipios of Belo Horizonte Milkshed," 1963.
18. Casadiegos, Jorge Gamboa; "Social System Study in a Brazilian Community," 1963.
19. Souza, Antonio Fagundes de; "Economic Analysis of the Dairy Enterprise in the Region of Juiz de Fora, Minas Gerais, 1962-1963,"
20. Rocha, Dilson Seabra; "Milk Improvement and Transportation Cost in 18 Plants, Minas Gerais, 1963," 1965.
21. Martini, Eduardo; "Sugar in Brazil - Production and Price," 1964.
22. Castro, Flavio Guilhon de; "Marginal Productivity Analysis of Resources Connected with Sugar Cane Cultivation in Ponte Nova Region, M.G., 1963-1964 Harvest," 1965.
23. Santos, Francisco Alves dos; "Analysis of the Effects of the Adoption of Higher Technological Levels on Beef Cattle in Pedra Azul, M.G., Ag. Year 1962-1963," 1964.
24. Silva, Jose Josi da; "Marginal Productivity Analysis of Resources Used in Beef Cattle Production in Montes Claros, M.G.," 1964.
25. Lima, Marcio Luiz Pelizzaro; "A Study of the Vegetable and Fruit Wholesale Market in Belo Horizonte, with Some Suggestions for Research," 1966.
26. Ribon, Miguel; "Partnership and Own Account in the Production of Coffee and Corn in Afonso Claudio, Espirito Santo,"
27. Xavier, Neide Uchoa; "Analysis of Professional Aspirations of Rural Young People in Vicoso and Cajuri," 1964.
28. Parra, Walker Augusto Covarrubias; "Vegetable Retail Market Performance in Belo Horizonte," 1964.
29. Araujo, Antonio Luiz Moreira de; "Family Income Distribution,"
30. Taranto, Benito; "Economic Analysis of Two Systems of Land Tenure, Pains, Minas Gerais, 1963-1964."
31. Christancho, Carlos Maciel; "Profit Maximization in the Farm Business Through Linear Programming," 1965.
32. Moura, Geraldo Augusto de Coni e; "Cacao Supply Structural Relationships in Brazil, 1942-1963."

33. Schuh, Maria Ignez Angeli; "Adoption of New Technologies in the Agriculture of Campinas, Sao Paulo, 1963-1964," 1967.
34. Vergara, Otto Filho; "Social and Economic Analysis of Inter-Rural Migrations; Ceres and Rubiataba, Goias," 1965.
35. Cox, Roy Raymond; "Analysis of Resource Distribution Through Production Function in the Cacao Region of Bahia, 1963-64 Harvest," 1965.
36. Rosso, Walter J. Tallone; "Structure Estimates of Corn Supply Relationships in the State of Minas Gerais, 1944-1962," 1965.
37. Yokomizo, Clando; "Producers, Wholesalers and the Marketing of Rice and Corn in Ituiutaba, Triangle of Minas Gerais, 1965 and 1966."
38. Oliveira, Evonir Batista de; "Economic Analysis of a Production Function, Corn, Patos de Minas, Ag. Year 1964-1965."
39. Braga, Geraldo Rodrigues; "The Forestry Situation and a Program of Reforestation for the Region of Vicosa, M.G., Brazil,"
40. Alencar, Geraldo de; "Effects of Inflation on Agricultural Credit, Costs and Prices of Agricultural Products."
41. Vieira, Guaracy; "Comparative Analysis of the Use of Factors of Production in Different Agricultural Enterprises in Lavras, Minas Gerais, 1964-1965."
42. Pacheco, Guaraci; "Identification of Leaders and Analysis of Their Characteristics in Two Communities of Interior Minas Gerais," 1966.
43. Hurtado, Hernan Zeballos; "Analysis of Agricultural Resource Marginal Productivity in Varginha, M.G., Ag. Year 1964-1965."
44. Paschoa, Joaquim Laercio Fonseca de; "Consumption of Milk in Belo Horizonte in Relation to Income, Years of Schooling and Age."
45. Noronha, Jose Ferreira de; "Coefficients of Production for Milk in Six Counties of Minas Gerais."
46. Fagundes, Lourival Martins; "Industrial Reality of 11 Municipios of Zona da Mata in the State of Minas Gerais - Ideas on Programming."
47. Ladeira, Sebastiao Raymundo; "Valuation of Land as Affected by Roads and Their Economic Relations," 1967.
48. Barbosa, Tulio; "Economic Characteristics of Agriculture in the Region of Vicosa - Guides for its Development," 1966.
49. Sugai, Yoshihiko; "Planning of an Agricultural Enterprise by Linear Programming."

50. Quixada, Claudio Regis de Lima; "Marketing of Cotton at the Producer Level in Porteirinha, Zone of Itacambira, Minas Gerais, 1965-1966."
51. Gastal, Edmundo da Fontoura; "Efficiency in the Use of Resources in Agricultural Production in Alegrete and Ibiruba, Rio Grande do Sul, 1960-1961."
52. Romero, Guillermo Castelhanos; "Planning of Farms by linear Programming in the Jequitinhonha Valley."
53. Barroco, Helio Estrela; "Market Analysis, Comercinho, Itaobim and Medina, Medio Jequitinhonha, M.G., 1965-1966."
54. Soares, Joao Batista de Lima; "Agricultural Credit and the Capital Structure of Farms in Montes Claros and Almenara, M.G., 1965-1966," 1963
55. Teixeira, Juraci Aureliano; "Profit in Cotton Production in Porterrinha and Espinosa, M.G., 1965-1966."
56. Alencar, Maria Helena; "Study of Leadership and Barriers to the Growth of the Cooperative Movement in Three Counties of Medio Jequitinhonha, M.G., 1966."
57. Silva, Paulo Roberto; "Production Function Analysis of the Use of Fertilizer in the Production of Beans in the Zona da Mata, M.G.," 1967.
58. Paez, Paulo Brasil; "Partial Evaluation of a Regional Plan in the Brazilian Northeast," 1968.
59. Ochoa, Ramon Guillermo Cuellar; "Economic Relationships in the Costs of Sugar Manufacture, Fonte Nova, M.G., 1965-1966."
60. Hernandez, Nelson Amaral; "Study of the Productivity of Resources Involved in Poultry Production, Demonstration Area of San Ramon, Uruguay, 1965-1966."
61. Sampaio, Fernando Sales; "Selection of Agricultural Enterprises by the Method of Program Planning, Vicosa, M.G., 1966-1967."
62. Barroso, Nilo Alberto; "Analysis of the Use and Distribution of Resources on Farms of Meia Ponte and Mato Grosso de Goias; Goias, 1966-67," 1968.
63. Restrepo, Juan Arturo Tobon; "Study of Profitability of Farms of the Zona de Mato Grosso de Goias, Goias, 1966-1967," 1968.
64. Carrasco, Eleodoro Silva; "Planning of Farms in Itumbiara, Piracanjuba, and Pontalina, Goias by the Method of Program Planning."
65. Vaz, J. Jorge Marques; "Size of Farm in Agrarian Reform and its Implications for Consumption of Goods and Services, Passo Real, R.S., 1968."

66. Gomez, Jorge L. Suescun; "Productivity of Resources in the Production of Rice, Corn and Beans in Mato Grosso de Goias and Meia Ponte, Goias, 1966-1967."
67. Gonzales, Tomas Backer Ecos; "Diagnosis of the Use of Factors of Production in Milk Production and Suggestions for Their Greater Efficiency, Resende, Rio de Janeiro, 1967-1968."
68. Peres, Fernando Curi; "Productivity of Resources in the Milkshed of Brasilia, Guides for a Program of Credit, 1967-1968."
69. Tafani, Ricardo Rodolfo; "Marketing of Milk in Rio Cuarto, Provincia de Cordoba, Argentina, 1967-1968."
70. Elena, Miguel Angel; "Economic Relationships in the Use of Resources in the Production of Beef Cattle, Rio Cuarto, Provincia de Cordoba, Argentina, 1966-1967."
71. Felicio, Antonio Filho; "Production of Potatoes and Their Marketing at the Producer and Wholesaler Level, Ipuina, M.G., 1966-1967."
72. Vieira, Manuel Sergio Xavier; "Cost of Production of Milk in Selected Counties in the Milkshed of Guanabara, 1969."
73. Alvarenga, Sonia Coelho de; "Study of the Characteristics and Analysis of the Production of Milk in the Goiania Milkshed, Goias, 1966-1967."
74. Monteiro, Jose de Anchieta; "Production and Marketing of Garlic in Campo do Meio (Zona Sul) and Capim Branco (Zona Metalurgica) M.G., 1966-1967."
75. Castro, Jose P. Ramalho de; "The Agricultural Cooperative of Coffee Producers of Venda Nova: Marketing and the Use of New Technologies, Concicao do Castelo, E.S., 1966-1967."
76. Teixeira, Gloria Zelia; "Comparative Analysis of Methods and Techniques for Identification of Leaders, Vicoso, M.G., 1967."
77. Porto, Bento Souza; "Economic Analysis of Systems of Transportation of Beef Cattle from Mato Grosso to Sao Paulo, 1969."
78. Simoes, Maria Helena; "Adequate Diets of Minimum Cost in Cristalina, Goias."
79. Araujo, Roberto Rodrigues Correa de; "Identification of Technology and Efficiency Level in the Resource Usage in Vale do Palmital, M.G., Ag. Year 1962-1963," 1964.

APPENDIX B

AGRICULTURAL ECONOMICS RESEARCH AT PURDUE ON BRAZILIAN TOPICS

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1. Bethlen, F. R.; "Effects of Brazilian Economic Development and Price Policies on Brazilian Wheat Imports," 1962.
2. Youmans, R. C.; "An Empirical Study of Underemployed Agricultural Labor in Selected Areas of Minas Gerais, Brazil," 1966.
3. Cone, Bruce W.; "Agricultural Expansion: The Minas Triangle, Brazil," 1969.
4. Paniago, Euter; "An Evaluation of Agricultural Price Policies for Selected Food Products: Brazil," 1969.
5. Teixeira, A. R.; "An Evaluation of Methodology Employed in the Estimation of Farm Level Production Functions," 1970.
6. Patrick, G.; "Education and Agricultural Development in Eastern Brazil," 1970.
7. Ayer, Harry; "Costs and Returns to Cotton Research, Sao Paulo, Brazil," 1970.
8. Whitaker, Morris; "Labor Absorption in the Industrial Sector of Brazil: An Econometric Analysis," 1970.

M.S. Theses Completed

1. Brandt, Sergio; "Effect of Economic and Social Variables on the Purchasing Level of Eggs, Vicosia, M.G., Brazil," 1963.
2. Paniago, Euter; "Production and Price of Coffee," 1963.
3. Cone, Bruce W.; "An Economic Analysis of Fertilizer Use in the Production of Cotton - The Campo Cerrado of Brazil," 1966.
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