

UNITED STATES GOVERNMENT

Memorandum

TO : Harlan Davis & E. B. Bowen, ARDO

DATE: December 27, 1971

FROM : Stanley F. Krause, PASA/USDA

SUBJECT: Comments on Purdue Proposal, Economic
Analysis of Technical Change

This proposal involves economic analysis of various policy issues connected with alternative technologies in producing corn and grain sorghum. In later stages, research would include other crops. Issues such as impact on output, employment, and income distribution are mentioned. Research would be related to Brazil, Argentina, Colombia, and perhaps Pakistan.

The research objectives are worthwhile, and Purdue has the expertise.

However, I recommend that AID/Brazil not support the proposal in its present form.

1. The proposal is inadequately linked, in its presentation, to the DNPEA/MA research program in selected products.
2. The proposal shows no awareness of EAPA/MA.
3. Proposal would contribute inadequately to institution-building in Brazil and other countries, by evidently being primarily located in the U.S..
4. Proposed staffing at the senior level is highly fragmented: 40% in one case, 12-30% for 5 others for the 3 years. This includes 20% of the time of Ed Schuh for 6 months, and 15% for 2 years, for all countries.

A budget of \$680,000 is proposed, for 3 years, looking toward 2 more years, as yet unbudgeted. Let us assume 1/3 to 1/2 of this charged against aid to Brazil.

I propose that comparable resources would be better used in Brazil on the same research problem, within quite a different framework. The institutional linkage should be principally (not incidentally) to DNPEA (the EPE Loan Program) and EAPA of MA. The analysis should concentrate on "improved" technologies identified and proposed under the DNPEA research program. The senior staffing should be concentrated with 2 or 3 people, who would be able to spend significant time with host institutions. This kind of structure would contribute more to institution-building objectives, especially to real linkage between technical and economic research. This would complement the DNPEA program to a maximum extent.



Specific weaknesses of the proposal are evident on page 8, procedure; page 11, institutional linkage; and pages 14-15, budget.

Page 8 says "relevant technology sets" will be analyzed. We haven't yet identified relevant improved technology sets for corn or sorghum in Brazil. What if this work gets ahead of the DNPEA agronomic research program? Project is of little value except as linked directly to that program. As proposed new technologies are identified they should be subject to the described kind of analysis.

Page 11 describes institutional linkage, naming 8 institutions and then mentioning Ministry of Agriculture. Linkage to Ministry of Agriculture should come first, DNPEA because of its central role in the new research program, and EAPA at least so the work would contribute to its growth.

Pages 14 and 15 indicate fragmentation and US-focus of work.

Division of Sponsored Programs
PURDUE RESEARCH FOUNDATION
Lafayette, Indiana

May 1971

PRINCIPAL INVESTIGATOR:

cc: WAellis T. C. Kerr
Department of Agricultural
Economics
SFK/cn

APPROVED:

H. H. Kramer, Director
Agricultural Experiment Station

APPROVED:

C. E. French, Head
Department of Agricultural
Economics

R. L. Kohls, Dean
School of Agriculture

D. W. Thomas, Director
International Programs in
Agriculture

A RESEARCH PROPOSAL

on the

ECONOMIC ANALYSIS OF TECHNICAL CHANGE
IN GRAIN PRODUCTION IN DEVELOPING COUNTRIES

Prepared by

Department of Agricultural Economics
International Programs in Agriculture
PURDUE UNIVERSITY
LAFAYETTE, INDIANA

Submitted to

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C.

through

Division of Sponsored Programs
PURDUE RESEARCH FOUNDATION
Lafayette, Indiana

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APPRO
FILE COPY

PURDUE UNIVERSITY
Space and Equipment Certification

Project Director: H. H. Kramer, Director
Agricultural Experiment Station
D. W. Thomas, Director
International Programs in Agriculture
Department: Department of Agricultural Economics
Title of Proposal: A Research Proposal on the Economic Analysis of
Technical Change in Grain Production in Developing
Countries
Proposed Sponsoring Agency: Agency for International Development,
Department of State, Washington, D.C.
Date Submitted: May 1971
Sponsor's Deadline for
Submission of Proposal:

The space and equipment required to conduct the proposed work (including laboratories, offices and facilities) are available within the resources of the Department/School. If not available, costs for these items are included in the proposed budget.

The Department/School is either unwilling or financially unable to acquire the equipment requested in the proposal with its own resources. The justification for the equipment requested in the proposed budget is fully identified in the attached application.

In accordance with the best estimate of needs, all computing services which will be required are included in the proposed budget.

The Department Head and Dean hereby approve the proposed project for submission to the suggested sponsor.

C. E. French, Head
Department of Agricultural
Economics

H. H. Kramer, Director
Agricultural Experiment Station

D. W. Thomas, Director
International Programs in
Agriculture

R. L. Kohls, Dean
School of Agriculture

PROJECT SUMMARY

Project Title : Economic Analysis of Technical Change in Grain
Production in Developing Countries

Contractor : Purdue University
Lafayette, Indiana

Principal
Investigators : T. C. Kerr, Assistant Professor
W. H. M. Morris, Professor
J. Havlicek, Professor
T. K. White, Associate Professor
G. E. Schuh, Professor

Duration : Five years, beginning July 1971

Estimated Costs : First three years - \$679,963

Funding requested: FY 72 - \$204,255
FY 73 - \$233,976
FY 74 - \$241,732

Background and Problem Statement

The production of grain in many of the developing countries is currently undergoing a major technical transformation. The most dramatic evidence of the "Green Revolution" is the success of high-yielding varieties of wheat and rice in Mexico, the Philippines, India and West Pakistan. Current experience with wheat and rice in these areas is indicative of the much greater potential for technical transformation of grain production throughout the developing nations.

Certain factors result in wide differences in the applicability of the new grain production technologies among the developing countries; these countries have heterogeneous agricultural resource bases, their capital/labor and labor/land endowment ratios differ substantially both between individual developing countries and between the developing and developed countries; also, and most importantly, a major part of the new grain production technology has been created in the developed countries.

The situation may be summarily stated as one of the developing countries being faced by a considerable potential supply of new agricultural technology; that is, technology developed and currently in use in various developed countries but not yet adopted by the developing nations. In addition, substantial potential exists for developing original new technology in the developing countries provided that adequate local research facilities are developed. Problems occur in deciding which technology or bits of technology should be pursued at the research level, promoted through extension, and adopted in agriculture under widely different circumstances. Adoption of technology is not costless either privately or socially. Most of the available technology has been created within the developed countries (notable exceptions are the dwarf wheats and rice varieties developed in Mexico and the Philippines, albeit through the efforts of the international foundations) and is not directly transferable to situations characterized by different ecologies, factor endowments and factor prices. Successful transfer requires adaptive research which in some cases may be quite costly.

Of much greater importance than the research costs is the fact that the various elements of the new technology have widely different effects on output, factor employment and income distribution within agriculture and in the rest of the economy. For example, certain elements of mechanization may be directly laborsaving in their nature. Adoption may result in no increase in aggregate output from agriculture, merely causing some labor displacement with no regard to the availability of alternative employment. On the other hand, certain elements of the new technology may have much more pervasive effects. For example, the dwarf wheats, when supplied with fertilizer, herbicides and pesticides on land under controlled irrigation, have significant output effects and significant impact upon factor employment, income and income distribution within agriculture and in the rest of the economy.

In general, technical change in an industry results in either an increase in real output or a net outflow of factors (labor and capital) from that industry, or some combination of both. Therefore, an analysis of technical change, particularly if the industry in question is a major part of the economy such as agriculture is in the majority of the developing nations, must consider the impact of the technical change in agriculture on levels of commodity output and prices, factor employment and income not only within agriculture but through the economy.

Given the relative income elasticities of demand for food and non-food products, success in raising per capita real incomes through development requires that a substantial flow of resources, labor and capital be released from agriculture. Technical change in agriculture makes this possible.

There is evidence that research on corn and sorghum is at a stage such that substantial increases in output and quality (high-lysine corn) may accrue to countries which carry out the necessary adaptive research and then adopt the high-yielding corn and sorghum technologies currently under development. Adoption of these technologies may be associated with substantial change in cultural and harvesting practices, multiple cropping,

mechanization, storage, agricultural input requirements, marketing services, etc. These elements of the technical change may differ widely with respect to their impact on resource use, ranging from laborsaving through neutral to land and capital saving. Their differential impacts on real output, employment and income distribution are so substantial that adequate specification of the effects of the technical change requires analysis not only of the impact on commodity demand, output, employment and income distribution in the agricultural supply and marketing sectors and in the rest of the economy. The rest of the economy must be included where technical change within agriculture results in a substantial change in real income which is then reflected directly in a change in consumption demand for goods produced in the rest of the economy with an attendant increase in employment of labor and capital in the non-farm sector.

Some writers discussing the technical revolution in agriculture, the so-called "Green Revolution," have used the phrase "second and third generation problems" to categorize impacts of the change in agricultural production technology upon the agricultural supply and marketing sector and the rest of the economy. In many respects, this is a misnomer. These "second and third generation" effects are an integral part of, and in some cases occur simultaneously with, the adoption of a new production technology. As such, they have to be treated as such and analyzed in conjunction with the alternatives available to the production sector in order to adequately appraise policy alternatives in the production, extension and adoption of new technology in agriculture.

Rationale for AID Support

The developing nations, in many instances assisted by AID, private foundations and other international institutions, have been and are investing in the development and adoption of new agricultural technology. Results from this investment have been significant in a number of countries with respect to certain commodities. This is particularly true of the success with high-yielding wheat and rice and is potentially true of work currently underway with corn, sorghum and other crops.

The current stage of adoption of the wheat and rice packages illustrates the need for comprehensive economic analysis of the alternatives available in adopting new technology in agriculture. In some cases, the production revolution has been enormously successful in its output effect, but the concurrent impacts on factor employment, income distribution, agricultural inputs and marketing services, storage and transportation are only now beginning to be appreciated. In many instances, the resulting problems in these areas are so substantial that, had they been identified and evaluated prior to adoption, a different set of new technology might have been accepted or at least a different staging pattern and rate of adoption of component parts of the new technology would have been selected.

This suggests two different concerns in the analysis of technical change. First, the potential return to investment in agricultural technology can be realized only when the policy alternatives have been

evaluated through comprehensive economic analysis of the type proposed in this project. Specifically, the particular components of technical change in agriculture have quite different effects upon income distribution, factor employment, input and marketing requirements. These characteristics of the various elements of technical change must be specified in order to assess whether or not the benefits of their adoption outweigh the adjustment costs to the economy. Given that there is a net benefit, the optimal pattern of adoption may be determined for individual components of the new technology. The necessity for this analysis is created by the existence of externalities which appear as differences between the private and social costs of technological change. The most significant of these occur in the area of labor displacement and unemployment. Second, the production and development of further new technology should be appraised in the light of analysis of the effects of adopting existing technology. Knowledge of the differential impacts of the various elements of technical change (laborsaving and capital-saving) should be used to assess the social benefits of allocating more or less research effort to future production of the various elements of new technology.

The particular relevance of these issues is that the specific components of technical change which are developed and adopted are policy variables which can be affected by many direct and indirect government actions including taxation, tariffs, export taxes or subsidies, price controls and wage policies to name a few.

The current stage of development and potential for adoption of the new technology in corn and sorghum production presents an appropriate empirical base for the analysis of the issues discussed above. Methodologies developed and perfected in studies associated with these commodities may then be utilized in expanded future studies of the comprehensive economic and social impacts of alternative packages of technology applicable to other food and feed crops and to livestock production.

Specific contributions of the project which require and merit AID support are that it will provide:

1. Information on the impact of adopting various components of technical change in corn and sorghum production on output, real income, income distribution, employment, consumption and resource allocation within agriculture and other economic sectors of specific developing countries.
2. Specification of the adjustment process implicit in adopting different packages, or elements, of the new technology. This analysis will identify sensitivity points in the commodity and input marketing systems and specify mechanisms and policy alternatives necessary to trigger the desired behavior of marketing firms and institutions. The analysis will cover the agricultural input (with particular attention given to the labor market) and marketing sectors, both public and private, and will consider related issues such as additional tax revenue and sources thereof to fund increased

investment in public infrastructure, and the impact of the technical change upon foreign exchange earnings.

3. A measure of the potential benefits to research in developing specific elements of future agricultural technology.

Items 1 and 2 above constitute the appropriate appraisal of the benefits and costs of adopting existing new technology. Such analysis will facilitate the formation of appropriate policy on agricultural development expenditures.

Item 3 above is the "backward link" which will be provided by this study. That is, appraisal of the effects of adopting existing new technology will provide a basis for allocating research effort both to the development of future new technology and to adaptive research. For example, should the analysis reveal that components of the new technology which are directly laborsaving at specific periods of the year when no alternative employment exists (for the displaced labor) then the social benefits of research into similar technology would be minimal or even negative.

Scope: Objectives and Procedures

This research program has as its basic objective the development and quantification of an analytical framework for estimating the impact of technical change in agriculture upon commodity output and prices, factor employment, income and income distribution within agriculture and in major related sectors of the economy. The model will explicitly recognize the interdependencies between agriculture and the rest of the economy and will allow for evaluation of different strategies in scheduling and adopting elements of technical change in agriculture through specifying their differential effects on output, employment, income and income distribution. Adjustment problems will be specified for each strategy.

The analysis will be based upon (1) estimate of the relationship between income and consumption, (2) measurement of the impact of the new technology upon the farm firm, (3) assessment of the implications of adoption of new agricultural production technology upon resource requirements, structure and behavior in the agricultural commodity and input markets and (4) measurement of the effects of the technical change upon trade.

The introduction of technical change in agriculture will have a significant impact upon real income levels and employment within agriculture and in the non-farm sector. The primary effect of this change in income level will be a change in consumption demand for agricultural commodities, for the products produced by the industrial and service sectors of the economy and for imports. This aggregate income-consumption relationship is the most important and stable relationship characterizing any economy at any stage of development and will be the primary basis for the general equilibrium model formulated in this study.

The stability of the income-consumption relationship (the consumption function) in this context refers to the relative constancy of the average and marginal propensities to consume at all relevant income levels; the components of personal expenditure may vary sharply with income level and, in aggregate, with income distribution.

Agriculture will be studied at the firm level in order to properly assess the impact of technical change on the farm firm, its size, input and output mix, capital and labor use. This part of the study will distinguish between different types of farm and managerial talent and will identify differential effects on these types arising from the same set of technical options. The results of these analyses at the firm level will be incorporated into an aggregate model used to estimate changes in output, input requirements, etc., for the primary agricultural sector.

The analysis of the agricultural supply and marketing sector will provide estimates of the resource requirements, both domestic and foreign, necessary to meet the changes in agricultural output and input requirements due to adoption of the new technology. Also, the analysis will specify policy alternatives and institutional changes necessary to ensure adequate behavior and performance of the supply and marketing sector.

Income and direct and cross price elasticities of demand for the major food and feed commodities will be identified as will be elasticities for major groups of nonagricultural commodities consumed within agriculture. The composition of these groups of nonagricultural commodities will be based on similarity of demand characteristics and production characteristics for the commodities in question.

The analysis will provide detailed information on two sets of economic questions knowledge of which is essential to the formulation of rational internal development policies and programs and effective, efficient external technical and capital assistance programs. First, given a technical change, the new equilibrium position with respect to output, income, income distribution and employment will be specified. Employment estimates will include not only direct employment effects within agriculture but also employment effects within the agri-business sectors and the rest of the economy. Second, individual parts of the model will provide data on the adjustment problems posed by alternative schedules of adoption of different components of the new technology. This information will provide the basis for policy decisions regarding necessary public inputs and the pattern of technical change in agriculture which would be optimal for the economy in question.

The study will include a component on comparative advantage which will specify changes in world trade, production and relative prices of grains in the light of changed production technology in the developing countries. Also, for each country, the impact of the technical change on net foreign exchange earnings will be determined. The three major components in this analysis will be the change in agricultural net exports, the change in imports of consumption goods due to income changes and the change in imports of agricultural inputs. Existing commercial trade

policies will be evaluated in the light of the exchanged production technology.

Initial application of the model will be on new technology in corn and sorghum production with suggested locations being Brazil, Argentina, Colombia and Pakistan. Final decisions relative to countries to be included in the initial studies will be made in consultation with AID, foundation personnel and others. One of the reasons for the initial commodity base is that much of the basic work underway on improved corn and sorghum varieties is being conducted by Purdue and cooperating institutions in the developing countries. This includes work on the development of varieties of corn with opaque-2 and floury-2 genes and improvement of sorghum yields, nutritional qualities and other characteristics. Equally, these food and feed grains are widely grown in the developing countries, are the subject of considerable technological research by scientists in the developed and developing countries and in the international agricultural research institutes, and hold considerable potential for materially expanding the world grain supply.

While the main emphasis of the initial analysis will be on corn and sorghum, other grains will receive attention in that the effect of introducing of yield-increasing corn or sorghum technology will depend to some extent on whether the new technology will be competitive with (e.g., replace existing crops) or complementary to (e.g., allow multiple cropping) the existing cropping pattern. The sets of technology considered will encompass new varieties of corn and sorghum, improved cultivation and harvesting practices, multiple cropping, fertilizer, herbicides, pesticides, mechanization and storage.

The choice of the initial geographic base for the study is based upon the requirement that the potential technical change in corn and sorghum production would have important effects in the chosen countries, while meeting the condition that the countries exhibit different agricultural resource bases and different factor endowments.

The analytical model, methodology and operational expertise developed in the original group of studies will constitute a base for expanding the research program to other geographic regions where the fundamental economic issues under investigation are relevant and important. Some of the expanded work will be conducted by the Purdue research staff; some will be conducted cooperatively with researchers in the developing countries; as the results of the original studies are reported in scientific journals, research bulletins, special publications, seminars, workshops and the like, an increasing fraction will be conducted largely or solely by scientists indigenous to the developing countries. Special attention will be given to rapid and effective dissemination of research results. This will provide impetus to and accelerate this normal but unacceptably slow process.

Specific Objectives

Within the commodity base and geographic locations indicated above, the specific objectives of the study are:

1. To specify the impact of new technology upon agricultural output, purchased input requirements, marketing requirements, factor requirements and effects on farm size and organization encompassing both the larger commercial farms and the smaller scale, subsistence-type farm operations.
2. To identify changes necessary to meet the supply and marketing requirements of the agricultural sector given that the new technology is adopted. Domestic production of the required inputs, imports from abroad and the ability of existing marketing, storage and transportation facilities to accommodate the changed input demand structure in the farm sector will be appraised.
3. To determine required changes in the provision of marketing services and market structure to assure efficient transfer of increased agricultural production to urban centers and on export account.
4. To assess the economic impact of the specific sets of technical change in agriculture upon the rest of the economy. The assessment will include income, income distribution, employment, commodity prices and factor prices.
5. To determine the effects of new production technologies on the comparative advantage of corn and sorghum production in the study areas.
6. To estimate the change in net foreign exchange earnings which would be associated with the adoption of the new corn and sorghum production technologies in the countries studied. This estimate will be made in conjunction with an appraisal of current commercial trade policies and alternatives for the countries in question.

Procedures

The research approach will be as follows:

1. Determination of the relevant technology set for consideration in corn and sorghum production. This will be determined through consultation with biological and physical scientists involved in the basic and adaptive research currently underway in corn and sorghum. The technology set will include

new varieties, cultivation, harvesting and rotational practices, fertilizer, herbicides, pesticides and storage.

2. Development and quantification of the comparative statics macro model. The steps in this will be:
 - a. Determination of relevant sets of prices for agricultural inputs and output.
 - b. Analysis of the aggregate change (on a regional basis) in agriculture resource use, output and income due to separable elements of the new technology. This production process analysis will involve both mathematical programming techniques and simulation.
 - c. Analysis of the changes required in the agricultural supply and marketing sector. The initial phase will be descriptive of the existing organization thereby providing the basis for developing simulation models to analyze alternative policy and institutional changes in the sector.
 - d. Analysis of changes in consumption demand, the demand for intermediate goods in agriculture and factor demand. Appropriate elasticities will be estimated through use of a combination of econometric and budgetary (modified Frischian) methods for consumer goods (agricultural and nonagricultural), through econometric analyses and through derivation from production and consumption relationships for agricultural inputs (including the use of corn and sorghum as feed) and for labor and capital in agriculture and the rest of the economy. Appropriate techniques will be used to describe the factor markets and appraise their ability to perform their allocative functions. Labor markets will receive particular attention as will policy alternatives to improve their behavior.
 - e. Analysis of changes in trade. The change in comparative advantage due to the new technology will be analyzed through use of a programming model and through a modified Heckscher-Ohlin factor analysis. Appraisal of commercial trade policy will be through estimation of shadow exchange rates and use of a programming model to estimate the impact of specific changes in trade intervention upon foreign exchange earnings.
3. Sensitivity analysis of the macro model. This will identify critical parameters, areas and groups in the economy which would be sensitive to different scheduling and rates of adoption of various components of the new technology in corn and sorghum production.

4. Critical areas identified in Item 3 above will be the basis for a detailed analysis of the adjustment process in adopting and facilitating adoption of the new technology. Primary data will be generated and additional secondary data will be used in this stage of the analysis.
5. Refinement of the macro model in the light of additional data and the adjustment analysis.

The proposed schedule for completion of these components of the analysis is to take one to two years on the initial macro analysis. The adjustment analysis and primary data collection will begin in the second year and continue through the third at which time the final analysis of the initial work will be completed.

Relationship to Other Research

Most of the analysis currently available on the impact of technical change in agriculture in developing countries only considers the impact that the technical change has on agriculture. In some cases, the analysis includes the agricultural supply and marketing sectors with some consideration given to transportation requirements. Independently, work is proceeding on issues of growth in the industrial labor force in these economies. The potential for increased industrial employment, and its perceived importance, as evidenced by policies to foster import substitution has occupied considerable attention. Joint consideration of development in agriculture and industrial growth occurs in some highly aggregated empirical studies and in some theories of economic growth and development. Neither of these types of work provide a useful basis for appraisal of alternative strategies in developing and adopting new technology in agriculture.

The particular contribution of this project will be to construct and quantify a model which explicitly recognizes the interdependencies between agriculture and the rest of the economy and allows the evaluation of different strategies in scheduling and adopting elements of technical change in agriculture through specifying their differential effect on output, employment, income and income distribution. Adjustment problems will be specified for each strategy.

The project will be complementary to studies or programs underway or proposed at Purdue; first, a resource base grant from the Ford Foundation which will provide strong complementarity in Brazil; second, a possible grant from AID on evaluation of research priorities in tropical livestock production.

Institutional Linkages, Cooperation and Expanded Work

The proposed research program consists of systematic inquiry into some of the more complex phenomena associated with the modernization of traditional societies. The utility of the research results will depend upon the degree to which it becomes possible to meet a number of operational conditions in each of the study areas. Important among these will be access to relevant, reliable secondary data; the capability of generating essential primary data; information about the in-depth knowledge of the physical, biological, economic, social, political and technological milieu and legitimate entree to the indigenous public policy decision-making system. This means that much of the research should be conducted cooperatively with indigenous institutions and researchers. Establishment of effective working linkages between the Purdue research group and national and international groups interested in this set of problems will be of prime importance.

Identification of specific national linkages will be made upon final selection of original study areas. In the case of Brazil, there are several institutions with scientific capability to interact appropriately in this work. These are:

1. The Institute of Agricultural Economics of the Federal University of Viçosa.
2. The Institute of Agricultural Economics of the Secretariat of Agriculture of the State of São Paulo.
3. The Division of Rural Studies of the Secretariat of Agriculture of the State of Minas Gerais.
4. Institute of Economic Research and Studies of the University of Rio Grande do Sul.
5. The Department of Agricultural Economics of the School of Agriculture of the University of São Paulo at Piracicaba.
6. The Technical Office of Economic Studies of the Northeast of the Bank of the Northeast at Fortaleza, Ceará.
7. The Institute of Applied Economic Research, Ministry of Planning and General Coordination.
8. The Getulio Vargas Foundation.

Long-time professional working relationships between Purdue's Department of Agricultural Economics and these entities will facilitate greatly appropriate research linkages with one or more of the above. Additionally, the Ministry of Agriculture is mounting a major impact research program on five major food commodities, including corn and sorghum. Economic analyses of the impacts of such technological advance are an integral part of this program. It is anticipated that a cooperative linkage will be established with this program.

In the case of Argentina, it will be necessary to establish a cooperative working relationship with one or more national entities with research capability and interest in this set of economic issues. The most likely cooperators include:

1. Economics Research Center of the Instituto Torcuato di Tella in Buenos Aires.
2. Agricultural Economics Section, National Institute of Agricultural Technology.
3. The Agricultural Economics Project sponsored by the Ford Foundation.
4. Division of Economic Studies, the National Planning Commission of Argentina.
5. Department of Economics, National University of Cuyo, Mendoza.

In similar fashion, appropriate linkages will be forged with economics research institutions in Colombia, Pakistan or other countries selected for the original studies.

A special type of linkage will be established with worldwide technological research programs designed to produce improved corn and sorghum production technologies. Specifically, such arrangements will be made, as required, with the research network of the CIMMYT and CIAT and the research network being established by the sorghum program of Purdue University, the USDA, the University of Nebraska, the Rockefeller Foundation and the Ford Foundation.

While the original thrust of the research will concentrate on corn and sorghum, it is the intent of the program to expand to other sets of agricultural technology. This will be done in two ways. First, as resources and time permit, the studies conducted by the Purdue staff in collaboration with LDC scientists will be expanded to other commodities and areas where technical change poses major resource adjustment problems. Second, research groups in other U.S. universities, government entities and international institutes have accepted or will accept major responsibility for expanding agricultural technology applicable to the LDC's. Included are commodities such as wheat, soybeans, livestock and livestock products, and technologies such as weed and plant disease control, management of tropical soils, dry-land agriculture, irrigation and the like. Conceptual and empirical techniques developed in the original studies will be readily adaptable to quantitative assessment of the economic impacts of the adoption of these and other technologies by producers in the LDC's. Many of these U.S. institutions have economics research groups which would be interested in cooperating with the Purdue group in studies designed to attain objectives similar to those specified in this project but applicable to the particular sets of production technology with which their institutional colleagues are concerned. Appropriate linkages with selected individuals and institutions will be established as resources

permit and research priorities dictate. Cooperative research, funded through subcontracts, will be undertaken utilizing the general model and approach developed at Purdue. The principal constraint, here, will be funds made available to Purdue for such purposes.

Utilization of Research Results

The models, methodology and empirical results of this research program will be of immediate use to several groups.

First, to the developing countries in which the research is done, the results of the studies on corn and sorghum will provide those countries with detailed information on the effects of different strategies in adopting new technology in the production of corn and sorghum. Specific components of the study which should be of particular value to the developing countries will be specification of the impacts of adopting new technology in corn and sorghum production upon labor employment in agriculture and in nonagriculture; the effect upon foreign exchange earnings and balance of payments and information on the level of government and private services necessary in the agricultural supply and marketing sector in order to facilitate the adoption of technical change.

Second, to AID, the international foundations, other research organizations and the developing countries, the project will provide information on the relative benefits of the various types of technological (biological, chemical, cultural, mechanical, etc.) change within the area of corn and sorghum. As such, the project will provide some basis for evaluating the social benefits of conducting more research in each of these types of technology and may provide an indication of priorities in future research. To AID, this latter element is important in that it may provide some basis for AID allocating its research funds between the wide variety of current agricultural research endeavors.

Third, to economists and other social scientists, the model and methodology developed in the study should be of use in providing an understanding of the development process and provide a conceptual methodology for evaluating different strategies of technical change and economic development.

The means of informing these potential readers and users of the study will be through publication and personal communication. In the host countries, every effort will be made, through seminars and workshops, to obtain mutual transfer of ideas and criticism with foreign professionals. Governments will be informed of the research results when they are available. The research staff will be willing to discuss and elaborate on any use of the data. In the United States, dissemination of information will be through seminars and workshops and publications which will include progress reports, journal articles and monographs.

Agricultural Economics
ECONOMIC ANALYSIS OF TECHNICAL CHANGE

Proposed Budget		
	<u>% of Effort</u>	<u>7/1/71 - 6/30/72</u>
1. Salaries and Wages		
Project Administrator - D.W. Thomas	10	\$ 2,800
Kerr, T. - Co-Principal Investigator	40	6,400
Morris, W.H.M. - Co-Principal Investigator	20	4,220
White, T.K. - 9 months	30	4,432
Havlicek, J.	15	3,600
Schuh, G.E. (6 months)	20	2,600
Kehrberg, E.W.	15	3,555
Assistant Professor (September 1971)	100	12,450
Assistant Professor (January 1972)	100	7,500
Short-Term Staff (2 man months)		3,333
Graduate Assistants (4.66 man units)	50	21,667
Secretary		
Agricultural Economics (1.5 man units)	100	7,500
International Programs in Agriculture	25	1,250
Subtotal of 1		\$81,307
2. Indirect Costs (59.7% of 1)		\$48,540
3. Fringe Benefits		
TIAA and SS (15% of 50,890)		\$ 7,634
Insurance (1.3% of 81,307)		1,056
Workman's Compensation (8.4¢/100 of 81,307)		68
Subtotal of 3		\$ 8,758
4. Travel and Per Diem		
International		\$15,150
Domestic		7,000
Subtotal of 4		\$22,150
5. Supplies and Expenses		\$15,000
6. Computer		\$ 1,000
7. Acquisition of Relevant Books and Material		\$ 5,000
8. Publication of Research Results		\$ 500
9. Workshops and Seminars		\$10,000
10. Subcontracts		
Latin America (2)		\$ 9,000
Asia (1)		3,000
Subtotal of 10		\$12,000
TOTAL		\$204,255

Agricultural Economics
ECONOMIC ANALYSIS OF TECHNICAL CHANGE

Projected Budget

Category	% of Effort	7/1/72 - 6/30/73	7/1/73 - 6/30/74
1. Salaries			
Project Administrator - D.W. Thomas	10	\$ 2,996	\$ 3,200
Kerr, T. - Co-Principal Investigator	40	6,850	7,325
Morris, W.H.M. - Co-Principal Investigator	20	4,515	4,830
White, T.K.	15	3,150	3,370
Havlicek, J.	15	3,850	4,120
Schuh, G.E.	15	4,170	4,460
Kehrberg, E.W.	10	2,535	2,710
Assistant Professor	100	15,750	16,538
Assistant Professor	100	15,750	16,538
Short-Term Staff (2 man months)		3,500	3,675
Graduate Assistants (4 man units)	50	20,000	20,000
Secretary			
Agricultural Economics (1.5 man units)	100	7,875	8,269
International Programs in Agriculture	25	<u>1,313</u>	<u>1,379</u>
Subtotal of 1		\$ 92,254	\$ 96,414
2. Indirect Costs (59.7% of 1)		\$ 55,076	\$ 57,559
3. Fringe Benefits			
TIAA and SS		\$ 9,460	\$ 10,015
Insurance		1,199	1,253
Workman's Compensation		<u>77</u>	<u>81</u>
Subtotal of 3		\$ 10,736	\$ 11,349
4. Travel and Per Diem			
International		\$ 17,310	\$ 17,310
Domestic		<u>5,100</u>	<u>5,100</u>
Subtotal of 4		\$ 22,410	\$ 22,410

ECONOMIC ANALYSIS OF TECHNICAL CHANGE - Agricultural Economics

Category	% of Effort	7/1/72 - 6/30/73	7/1/73 - 6/30/74
5. Supplies and Expenses		\$ 17,000	\$ 17,000
6. Computer		\$ 3,000	\$ 3,000
7. Acquisition of Relevant Library Books and Materials		\$ 3,000	\$ 3,000
8. Publication of Research Results		\$ 2,500	\$ 3,000
9. Workshops and Seminars		\$ 10,000	\$ 10,000
10. Subcontracts			
Latin America		\$ 14,000	\$ 14,000
Asia		<u>4,000</u>	<u>4,000</u>
Subtotal of 10		\$ 18,000	\$ 18,000
TOTAL		\$233,976	\$241,732

JOSEPH HAVLICEK, JR.

- I. Born: April 18, 1934 - Rockford Ohio
- II. Married: Wife - Betty P.
Children - Joe Paul (7), John W. (5½), and Michael Edward (1½)
- III. Education: (a) Rockford Public School - Rockford, Ohio
1940-52 Diploma
(b) The Ohio State University, Columbus, Ohio; Sept. 1952-June 1955
B. S. in Agricultural Economics; Major - Agricultural Economics;
Minor - General Agriculture
(c) The Ohio State University, Columbus, Ohio; June 1955-August 1956;
M. S. in Agricultural Economics; Major - Agricultural Economics;
Minor - Statistics
(d) North Carolina State College, Raleigh, N. Carolina, Sept. 1956-
Nov. 1959; Ph.D., Co-major - Agricultural Economics and Statistics
- IV. Positions Held: (a) Dept. of Agricultural Economics, The Ohio State University, June
1955 - Sept. 1956-One half time graduate research assistant.
(b) Dept. of Agricultural Economics, N.C.State College, Sept. 1956-
July 1958 - One half time graduate research assistant.
(c) Dept. of Agricultural Economics, N.C. State College, July 1958-
Nov. 1959 - Full time research assistant.
(d) Agricultural Economics Branch, Tennessee Valley Authority,
Nov. 1959-Aug. 1961 - Agricultural Economist.
(e) Dept. of Agricultural Economics, Purdue University, Aug. 1961-
July 1964 - Assistant Professor.
(f) Dept. of Agricultural Economics, Purdue University, July 1964-
July 1968 - Associate Professor.
(g) Dept. of Agricultural Economics, Purdue University, July 1968
to present - Professor.
(h) Research Associate - Center for Urban Studies, University of
Chicago, Oct. 1, 1968 - Sept. 30, 1969.
- V. Experience: (a) Research in dairy marketing, production economics, livestock
marketing, spatial analysis, supply demand, and price analysis,
resource economics, regional analysis and solid waste management.
(b) Teaching-undergraduate and graduate courses in statistics,
graduate level econometrics and graduate level matrix algebra
for economists.
- VI. Society Membership: (a) Honorary
1. Sigma Xi
2. Gamma Sigma Delta
(b) Professional
1. American Agricultural Economics Association
2. American Economic Association
3. American Statistical Association
4. Econometric Society

II. NSF Fellow: U. of Missouri, June-Aug. 1965; Institute on the Mathematical Foundations of Constrained Optimization in Economics

III. Manuscripts and Publications:

A. Articles

1. Havlicek, Joseph, Jr., Tolley, George S. and Wang, Yi, "Solid Wastes" - A Resource?, Journal of the American Agricultural Economics Association, Vol. 51, No. 5, December 1969, pp. 1598-1602.
2. Myers, Lester H. and Havlicek, Joseph, Jr., "Some Theoretical Aspects of Short Term Hog Supply," Journal of Farm Economics, Vol. 49, No. 5, December 1967, pp. 1395-1400.
3. Judge, G. G., Havlicek, Joseph, Jr., and Rizek, R. L., "An Interregional Model: Its Formulation and Application to the Livestock Industry," Agricultural Economics Research Vol. XVIII, No. 1, January 1965, pp. 1-9.
4. Havlicek, Joseph, Jr. and Seagraves, James A., "The Cost of the Wrong Decision as a Guide in Production Research," Journal of Farm Economics, Vol. XLIV, No. 1, February 1962, pp. 157-168.

B. Technical and Research Bulletins

1. Erickson, Donald B. and Joseph Havlicek, Jr., "Supply Response of Cattle and Calves for Commercial Slaughter," Research Bulletin 813, Purdue University, Agricultural Experiment Station, Lafayette, Indiana, October 1966.
2. Rizek, R. L., G. G. Judge, and J. Havlicek, Jr., "Spatial Structure of the Livestock Economy III. Joint Spatial Analysis of Regional Slaughter and the Flows and Pricing of Livestock and Meat," North Central Regional Research Bulletin No. 163, Agricultural Experiment Station, South Dakota State University, Bulletin 522, October 1965.
3. Havlicek, J., Jr., R. L. Rizek and G. G. Judge, "Spatial Structure of the Livestock Economy II. Spatial Analysis of Flows and Slaughter Livestock in 1955 and 1960," North Central Regional Research Bulletin 159, Agricultural Experiment Station, South Dakota State University, Brookings, South Dakota, Bulletin 521, June 1964.
4. Judge, G. G., J. Havlicek, Jr., and R. L. Rizek, "Spatial Structure of the Livestock Economy I. Spatial Analysis of the Marketing of Meat Sector in 1955 and 1960," North Central Regional Bulletin No. 157, Agricultural Experiment Station, South Dakota State University, Brookings, South Dakota, Bulletin 520, May 1964.
5. Brandt, Sergio Alberto and Joseph Havlicek, Jr., "Estimativa Da Procura De Ovos Adquiridos," Instituto de Economia Rural, Serie Vicosa, Minas Gerias, Brasil, 1964.

6. Wabash Valley Interstate Commission, "Agricultural Production in the Wabash Valley - Projective Analysis of the Impact of the Proposed Wabash Valley Waterway on Agricultural Activity in the Adjacent Area," Wabash Valley Interstate Commission, Eight and Wabash, Terre Haute, Indiana, May 1967 (Analysis performed and 88 page report prepared by Babb, E.M., Haidacher, R. C. and Havlicek, Joseph, Jr.).
7. Prato, Anthony P. and Havlicek, Joseph, Jr., "Monthly Farm Level Demand for Slaughter Cattle," Progress Report No. 338, Purdue University Agricultural Experiment Station, Lafayette, Indiana, May 1968.
8. Myers, L. H., Havlicek, Joseph, Jr. and Henderson, P. C., "Short-Term Price Structure of the Hog-Pork Sector of the United States," Research Bulletin No. 855, Purdue University, Agricultural Experiment Station, Lafayette, Indiana, Feb. 1970.
9. Daniel, Raymond and Havlicek, Joseph, Jr., "Fertilizer Purchasing Patterns of Farmers, 1960-65," Research Progress Report 375, June 1970, Purdue University, Lafayette, Indiana

EARL W. KEHRBERG

Biographical Sketch

Born: Aberdeen, South Dakota
September 30, 1918

Parents: Mr. & Mrs. H. J. Kehrberg
Otterbein, Indiana

Education: Ortonville Public Schools, Minnesota 1925-1937
Teacher training, Ortonville, Minnesota 1938-1939
Iowa State University, Ames, Iowa 1946-1953

Degrees: B. S., Iowa State University 1949
Ph. D., Iowa State University 1953

Employment: Rural school teacher 1939-1942
U. S. Marine Corps 1942-1946
Research associate and/or instructor, Iowa State University, Ames, Iowa 1949-1953
Assistant Professor, Purdue University, Lafayette, Indiana 1953-1955
Associate Professor, Purdue University, Lafayette, Indiana 1955-1961
Professor, Purdue University, Lafayette, Indiana 1961 to date
Visiting Professor, Hochschule Hohenheim, Stuttgart-Hohenheim, Germany 1961-1962
Agricultural Economist with Purdue-Brazil Project, Rural University of Minas Gerais, Viçosa, Brazil 1966-1968

Marital Status: Married Norma Hanson, Ortonville, Minnesota July 23, 1945. Two children.

Associations: American Agricultural Economics Association
American Statistical Association
Society of Sigma Xi
Phi Kappa Phi
Gamma Sigma Delta

Foreign Languages: Portuguese, German

BIOGRAPHICAL SKETCH

T. C. Kerr

Born: 1935, Scotland

Education:

- 1) 1954 - 56 B.S.A. University of Glasgow and
- 2) 1961 - 63 University of British Columbia
- 3) 1963 - 64 M.S.A. Course-work,
University of British Columbia
- 4) 1967 - 70 Ph.D. (Economics) (1971),
The University of Chicago

Academic Awards,
Fellowships, etc.

- 1) 1961 - 62 The Dr. D.A. McKee Memorial Prize:
University Special Award
- 2) 1962 - 63 B.C. Government Scholarship
- 3) 1963 - 64 University of British Columbia
Fellowship
- 4) 1967 - 70 Ford Foundation and University of
Chicago Fellowships

Professional
Experience:

- 1) 1956 - 61 Agricultural Research: mainly plant
science with some farm account/budgeting
work. C.D.A. Research Branch, Prince
George, U.B.C.
- 2) Summer 62 Production function analysis (milk).
Dept. of Agricultural Economics, U.B.C.
- 3) Summer 63 Analysis, design and inception of a
system for pooling returns to soft fruit
growers. B.C. Tree Fruits Ltd., and
Department of Agricultural Economics,
University of British Columbia

- 3) 1964 - 67 Agricultural Economics research.
Concentration on the grain/livestock
sector of Canadian agriculture. Analysis
in the areas of supply, policy and institu-
tional framework.
Agricultural Economics Research Council,
Ottawa.
- 4) 1966 - 68 Sessional Lecturer (Part-time) in Economics
Carleton University, Ottawa.
- 5) 1970 - Assistant Professor, Dept. of Agricultural
Economics, Purdue University.

Major
Publications:

Drummond, W.M., W. J. Anderson & T. C. Kerr
"A Review of Agricultural Policy in Canada", Agricultural
Economics Research Council of Canada, Ottawa, 1966.

Kerr, T. C. "An Economic Analysis of the Feed Freight
Assistance Policy", Agricultural Economics Research
Council of Canada, Ottawa, 1966.

"Factors Influencing the Location of
Livestock Production", in Occasional Papers, Agricultural
Economics Research Council of Canada, Ottawa, 1967.

"Determinants of Regional Livestock Supply
in Canada" Agricultural Economics Research Council of
Canada, Ottawa, 1968.

Curriculum Vitae

W. H. M. Morris

A. College Education:

1. Attended Cambridge University from 1945 to 1950. Received B. A. and Post Graduate Diploma.
2. Attended Utah State University from 1950 to 1951.
3. Attended Cornell University from 1951 to 1953. Received Ph.D. degree.
4. Attended Iowa State College from 1953 to 1954 for post-doctoral work.

B. Awards and Honors:

1. Sigma Xi, Phi Kappa Phi
2. Member American Society of Agricultural Engineers
3. ASAE Correspondent to Section V, Farm Labor, CIGR
4. Member American Farm Economic Association
5. Member of International Association of Agricultural Economists
6. Was visiting professor at Max Planck Research Association, Germany, 1959, and visiting scientist in Netherlands Institute of Agricultural Engineering and Work Science and Agricultural University, Wageningen
7. Chairman, International Congress of Scientific Management of Farm Work, 1962-1964
8. Member American Heart Association Council on Epidemiology
9. Lately Chairman, Agricultural Waste Disposal Committee and Farm Structures Research Needs Committees of the ASAE
10. Lately member of Rehabilitation Committee and Preventive Medicine, Research Study Section, American Heart Association
11. Member of Executive Committee and Program Committee of the International Symposium on Livestock Wastes, to be held at Ohio State University, Center for Tomorrow, April 19-22, 1971

W. H. M. Morris

D. Research Experience:

Time and energy requirement study of milk cows, thesis, Cornell University, 1951-1953
Trusses for farm buildings, Iowa State College, 1953-1954
Purdue Farm Cardiac Project, 1943-1964
Work Efficiency Studies, 1954-present
Livestock production systems studies, 1960-present
Participant in New York Rehabilitation Institute Conference on Rehabilitation (Proceedings by White, Rusk, Williams, Lee), 1956
Wisconsin Conference on Work and the Heart, 1957, and Princeton (USPHS-AMA) Conference on Methodology in Epidemiological studies of C.V. disease
Ontario Heart Association International Symposium on Physical Activity and C.V. Health, 1966
Tufts University - USPHS Symposium on Cardiovascular Rehabilitation, 1965
IBM Symposium on Use of Computers in Agricultural Research, 1966

E. Research Program:

1. Engineering Economics

- (a) Livestock production experiments and associated field surveys (presently swine and dairy)
Assessing economics of farm building investment with specific management systems.
- (b) Livestock manure handling techniques and economics.
- (c) Mathematical approach to selection of work methods, machinery, and buildings in a production system.
- (d) Farm Machinery management. Costs and returns from different systems of mechanization of field crops. Machinery selection problems. Methods of financing farm machinery. Simulation models.

2. Growth of the Farm Firm

Simulation studies on the effect of different strategies and levels of management on rate of growth on the farm firm. This includes selection of crop and livestock production system.

Other Activities:

Teaching

- (a) Seminar on operations research in farm management decision making
- (b) An 8-week, sub-degree course in Farm Management. I have developed this to use the audiotutorial system

International Program

Development of an international program in agricultural economics at Purdue (since March 1, 1969)

Edit English translation of Annual Report of Swedish Institute of Agricultural Engineering (1968 and 1969, published in 1969 and 1970)

Major Publications and Reports

W. H. M. Morris

How Big Should the Swine Enterprise Be? J. E. Kadlec and W. J. M. Morris; Proc. Nat. Pork Producers Conf., Purdue Univ., January, 1966; Also J. Am. Soc. of Fm. Managers and Rural Appraisers 30 (1) 93-98; April, 1966.

Economics of Liquid Manure Disposal from Confined Livestock; Management of Farm Animal Wastes (proc. Nat. Symp. May 1966 pp. 126-131), Pub. by A.S.A.E., Mich. 1966.

Productivity and Cost of the Swine Farrowing and Nursery Systems; R. Daniel, J. E. Kadlec, W. J. M. Morris, H. W. Jones, J. E. Conrad, C. N. Hinkle, and A. C. Dale; Research Progress Report No. 315, Purdue Agricultural Experiment Station, September, 1967.

A Comparison of Bedding vs. Gas Heat in Open Front Growing-Finishing Houses; H. W. Jones, J. H. Conrad, J. E. Kadlec, W. H. M. Morris, M. A. Gallie, C. N. Hinkle and J. E. Mentzer; Research Progress Report No. 313, Purdue Agricultural Experiment Station, September, 1967.

A Comparison of Concrete vs. Partially Slotted Open Front Swine Finishing Houses; H. W. Jones, J. H. Conrad, J. E. Kadlec, W. H. M. Morris, M. A. Gallie, and C. N. Hinkle; Research Progress Report No. 314, Purdue Agricultural Experiment Station, September, 1967.

Management Systems for the Pregnant Sow, W. H. M. Morris and others, Swine Day Program, September, 1968.

Performance of Feeder Pigs from Slotted and Solid Floor Nurseries after Transfer to Solid and Slotted Floor Finishing Houses; W. H. M. Morris and others, Research Progress Report 350, September, 1968.

Production of Corn without Heavy Tillage--The Till Plant System, W. H. M. Morris, CIGR paper, 1968.

Part-Time Farming in the Midwest, W. H. M. Morris, CIGR paper, 1968.

Selection of Machinery and Livestock Production Systems in Relation to Type of Farm Using Mathematical Programming, W. H. M. Morris, CIGR paper, 1968

The Effect of Level of Mechanization on Farm Organization and Income--Farm Plans for Cardiac and Non-Cardiac Farmers in Central Indiana, George Casler and W. H. M. Morris, Research Bulletin No. 851, November 1969.

New Light on Costs of Operating Farm Machinery, W. H. M. Morris and J. H. van Kampen, presentation to the American Society of Agricultural Engineers, December 10, 1970.

G. EDWARD SCHUH

Biographical Sketch

Born: September 13, 1930

<u>Degrees:</u>	B.S., Purdue University (Agricultural Education)	1952
	M.S., Michigan State University (Agricultural Economics)	1954
	M.A., University of Chicago (Economics)	1958
	Ph.D., University of Chicago (Economics)	1961

<u>Honorary Degrees:</u>	Professor <u>Honoris Causa</u> , Universidade Rural do Estado de Minas Gerais, Vicoso, Minas Gerais, Brazil	1965
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<u>Employment:</u>	Graduate Assistant and Instructor, Michigan State University	1952-1954
	United States Army, Intelligence, 18 months in Japan and Korea	1954-1956
	Sears Roebuck Fellowship in Agricultural Economics, University of Chicago	1956-1959
	Instructor, Assistant Professor and Associate Professor of Agricultural Economics, Purdue University	1959-1962
	Agricultural Economics, Purdue-Brazil Project, Agricultural Economics Institute, Rural University of Minas Gerais, Vicoso, Minas Gerais, Brazil	1963-1965
	Professor of Agricultural Economics, Purdue	1965-date
	Consultant, Ministry of Agriculture, State Secretary of Agriculture for Minas Gerais, State Government of Bahia, Bank of the Northeast	1963-1965
	Bench-Mark Study of Brazilian Agriculture for the Ford Foundation	1966
	Evaluation of Agricultural Economics Research in Brazil for the Agricultural Development Council	1966
	Collaborator with U.S.D.A. in developing labor research in ERS	
	Program Advisor in Agriculture, the Ford Foundation, Brazil	1966-date

G. Edward Schuh
Biographical Sketch

Special

Awards:

American Farm Economic Association Award for the best Ph.D. thesis, 1961.

Major Professor for student who received the American Farm Economic Association Award for best M.S. thesis, 1963.

American Farm Economic Association travel grant to participate in meetings of International Association of Agricultural Economists, Lyon, France, August, 1964.

Grant from Ford Foundation for research program in Brazil to study the process of economic development.

Marital

Status:

Married

Member:

Sixma Xi

American Agricultural Economics Association
Judge of published research, 1967

Econometrics Society

American Economics Association

International Association of Agricultural Economists

Brazilian Society of Agricultural Economists

Foreign

Languages:

Portuguese (reading and speaking)
Spanish (reading knowledge)

T. KELLEY WHITE, JR.

Personal Data

Born: August 6, 1935, Stockbridge, Georgia

Marital Status: Married December, 1961 to Nancy A. Turner, two children

Present Address: 136 Dogwood Court, West Lafayette, Indiana 47906

Education and Thesis Topics

- (1) Grammar and Junior High School - Stockbridge, Georgia
- (2) High School - Henry County High, McDonough, Georgia
- (3) College, Undergraduate - University of Georgia, 1953-57; B.S. in Agriculture with major in Plant Breeding and minor in Botany
- (4) College; Graduate - University of Georgia, 1958-60; M.S. with major in Agricultural Economics; North Carolina State University at Raleigh, 1960-1966; Ph.D. with major in Economics and minor in Statistics
- (5) M.S. thesis, University of Georgia, 1960, An Economic Analysis of Differences in the Agriculture of Two Areas of Georgia for 1950 and 1954
- (6) Ph.D. thesis, North Carolina State University, 1966, The Economic Feasibility of Expanding Production and Processing of Jute in Peru

Experience

1958-1960; Research Assistant (full-time), Department of Agricultural Economics, University of Georgia; Major Professor, Dr. R. E. Proctor. During this period two studies were conducted. These were (1) an historical survey of the agriculture of the Southern Appalachians and (2) a contract project for the Southeast River Basin Study Commission which included an inventory of resource availability and projection to 1975 and 2000 of agricultural resource needs.

1960-1963; Instructor, Department of Agricultural Economics, North Carolina State University; Major Professor, Dr. A. J. Coutu. Duties included teaching Farm Business Management in the Agricultural Institute (a two-year technical agricultural program) and conducting research in farm management and area development.

1963-1965; Research Assistant, North Carolina University Agricultural Mission to Peru. Duties as Economics Advisor to SIPA included conducting research in cooperation with Peruvian counterparts, advising SIPA personnel on research techniques, participating in short-courses and training programs and teaching at the agricultural university.

1965-1966; Instructor, Department of Economics, North Carolina State University. Duties include research and teaching a junior-level course in farm management.

1966-Present; Assistant Professor, Department of Agricultural Economics, Purdue University. Activities include teaching (courses in Advanced Production Economics, Agricultural Statistics and Farm Management have been taught during the past two years) and research in the areas of production economics, farm management and economic development.

1969- ; Associate Professor, Department of Agricultural Economics, Purdue University.

Publications

Proctor, R. E. and T. K. White, "Agriculture: A Survey," The Southern Appalachian Region: A Social and Cultural Study, The University of Kentucky Press, Lexington, Kentucky, 1962.

White, T. K., A. J. Coutu, R. L. Rizek and W. D. Toussaint, Farm Adjustments for Changes in Resource Levels, Product Prices and Allotments: Northern Coastal Plain, Economic Area 7, North Carolina, Dept. of Agricultural Economics, A.E. Information Series No. 103, North Carolina State College, Raleigh, North Carolina, 1963.

White, T. K., and Luque V. Carlos, Capacity of Quinoa to Compete for Consumer Expenditures and Farm Resources, North Carolina University Agricultural Mission to Peru Mimeograph Series, Lima, Peru, 1965.

Schrader, L. F. and T. K. White, "Indiana Agriculture - 1959 and 1964," November 1966, EC-311.

Schrader, L. F. and T. K. White, "Recent Changes in Indiana Agriculture," Economic and Marketing Information, March 31, 1967.

White, T. K. "Science and the World Food Problem," Tarheel Farm Economist, North Carolina State University, August 1966.

White, T. K., Review: Intermediate Economic Statistics, by Karl A. Fox, New York, John Wiley & Sons, Inc., 1968, Journal of Farm Economics, Vol. 50, No. 3, August 1968, p. 780.

Boehlje, M. D. and T. K. White, "A Production-Investment Decision Model of Farm Firm Growth," approved for publication in American Journal of Agricultural Economics.

Graduate Student Theses Supervised in the Last Five Years

M.S. Completed - 3

Ph.D. in Process - 2

M.S. Non-Thesis - 1

Graduate Student Theses

"An Analysis of the Impact of Selected Factors on the Process of Farm Firm Growth," M.S., 1967 (publication in process), Boehlje, M.D.

"A Cost Analysis of On-Farm Corn Drying as Affected by Weather Variability," M.S., 1968 (unpublished) Welch, Richard L.

"Agrarian Reform in Colombia - Efficiency of Resource Allocation in One Parcelization Project," M.S., 1968 (unpublished), Samper, R.D.

Professional and Honor Societies

- (1) American Farm Economics Association
- (2) Alpha Zeta (initiated 1956)
- (3) Phi Kappa Phi (initiated 1960)