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for analysis of

FACTORS ASSOCIATED WITH DIFFERENCES
AND CHANGES IN AGRICULTURAL PRODUCTION
IN UNDERDEVELOPED COUNTRIES

By
Foreign Development and Trade Division
Economic Research Service
United States Department of Agriculture

January 1967

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This seventh semi-annual report describes progress on the productivity project during the last six months of 1966. The first progress report, dated November 1963, and the Participating Agency Agreement No. 12-17-0017-132 should be referred to for background information. The second to the sixth semi-annual progress reports list accomplishments through June 1966.

I. Distribution of Phase A Report:

Distribution continues of the report presenting major results and findings of Phase A activities, published as "Changes in Agriculture in 26 Developing Nations, 1948 to 1963," Foreign Agriculture Economics Report No. 27. The excellent reception of this report and general nature of distribution were noted in progress report No. 6. The third printing, made in June 1966, continues in adequate supply.

II. Construction of Crop and Livestock Production Indices:

Work continues to construct livestock production indices for 15 of the 26 countries included in Phase A and to construct crop production indices for 20 additional countries.

The quality of basic data available for the construction of indices and the press of other work have continued to delay completion of the work. However, by December 1966, the required data for several countries had been completed and assembled by country specialists. Most of the remaining country data were in draft form and it is expected that all country data will be submitted in final form by country specialists by about January 31, 1967.

With compilation of data thus nearly completed, specific plans were made during December 1966 for analysis and presentation of the data. Table formats were prepared, patterned after several tables in FAER 27. These suggested tables and the proposed content of the report were discussed at a meeting of ERS staff and a representative of the AID office of Technical Cooperation and Research.

Proposed tables include six on crop production, four on livestock production, and two that would combine crop and livestock data.

These tables will be completed early in 1967, and accompanying discussion prepared. These tables involve substantial computational work. This work has been assigned to David Mateyka, under the direction of Stanley Krause.

III. Phase B Progress and Plans

By the end of December, 1966, Dr. L. Jay Atkinson, the project leader for the study in Colombia, had arrived in Bogota. Colombia is the last of the seven countries to be included in this project. It was decided late in 1966 to limit the study to seven countries. Therefore, the pending memoranda of understanding with Turkey and Tunisia were withdrawn and these countries were dropped from project plans. The status of each country study and tentative timetable for completion are presented later in this report.

A. Productivity measures

During this report period, further consideration was given to the development of suitable measures of components of change in agricultural productivity. Alternative methods of separating changes in aggregate output into percentages due to changes in acreage, yield, and the kind of crop grown were evaluated. (Comparable factors applicable to animal products are animal numbers, yield per animal, and change in species).

Principal persons engaged in this re-study were Wade F. Gregory and John Schaub of the Economic Development Branch, Donald Durost of the Farm Production Economics Division, Louis F. Herrmann in Brazil, and Lawrence Shaw, now at Vanderbilt University. Revised methods of computation were recommended to Dr. Shaw, and agreement was reached with Dr. Herrmann about methods he would use in Brazil. It was agreed that methods similar to those used in recent analyses

of productivity in U.S. agriculture probably would form the central core of most country analysis, and inter-country comparisons. These correspond very closely to the method used in the Phase A report. No major advantages were found in alternative methods that were considered.

B. Travel to Brazil, Mexico, and in U.S.

1. In November, Director Bachman conferred in Brazil with Dr. Herrmann about the progress and plans relating to the study in Brazil.

2. In early December, Mr. Gregory conferred in Mexico with Mr. Herrmann about progress of the Mexico study, and plans for its completion.

3. In October, Mr. Gregory led a seminar for the Agricultural Economics Department, Purdue University at which he presented a paper entitled "Prospectives on World Agricultural Development".

4. In November, Mr. Gregory attended a "Conference on Key Problems of Economic Policy in Latin America" at the University of Chicago. At that conference, Mr. Gregory presented comments on papers relating to agrarian reform.

C. Brazil

Work in Brazil became actively underway in March 1966 when the leader, Dr. Louis F. Herrmann finished language training. Dr. Herrmann is expected to return from Brazil about June 1968, and to complete a draft report about September 1968.

Principal activities during July - December 1966 consisted of:

1. Developing procedures for analyzing changes in agricultural output into components attributable to changes in area cultivated and livestock numbers, changes in yield, shifts in composition of output by products and shifts in location of production.

2. Assembling data required for the proposed analysis of output.
3. Negotiating special studies of selected aspects of agricultural output and productivity in Brazil. A contract was written with the University of Rio Grande do Sul, discussed later.
4. Assembling and studying reference material related to agricultural development in Brazil.

Plans for Analyzing Changes in Agricultural Output.

Agricultural output in Brazil has grown largely by bringing additional land under cultivation, and the country still has much potentially arable land. (See FAER-27, Chapters 2 and 3). A more detailed analysis of the country's past experience is needed for a better understanding of the contribution made by the various sources of increased output. Considerable effort has been given to developing an analytical model for this purpose.

Assembly of Output Data

Annual data on crop acreages, livestock numbers, and quantity and value of production for 33 products will be used. The data have been compiled for most of these products, or are expected to be completed shortly after the beginning of the year. A special effort was made to compile output data for the eastern and western halves of the State of São Paulo. This also is nearing completion.

Special Studies of Productivity

Negotiations which were begun in May culminated in a contract with the University of Rio Grande do Sul for a study of agricultural productivity in selected municipalities of Rio Grande do Sul. The work will be done in the Institute of Economic Studies and Research of University of Rio Grande do Sul. Economic and sociological factors characterizing farms and farmers in municipalities with substantially different

rates of growth in agricultural output will be studied.

Negotiations have continued on a possible study of productivity in Ceara, in the Northeast of Brazil, a drought-ridden distress area which, nevertheless, has shown some progress.

Prospects are favorable for locating a contractor to process the data for analyzing changes in agricultural output in Brazil according to the specifications referred to above. A professor now at the University of Wisconsin, experienced in electronic data processing, with two years residence in Brazil, has indicated his willingness to participate in this activity and to supervise the data processing, so a contract with the University of Wisconsin for this purpose is being considered.

Assembling and Studying Reference Material.

As opportunity arose, data and references relevant to the project were accumulated. The collection of data is being guided partly by a list and index of statistical data compiled largely from FAER-27, and by a tentative project outline. An index of more than 100 items has been compiled.

About mid-November the Gétúlio Vargas Foundation assigned an economist, Mauro Lopes, to work as the Brazilia Counterpart to Dr. Herrmann on the project. Mr. Lopes' first task is to assemble statistics and other information pertaining to agricultural credit in Brazil.

Plans

Priority will be given to evaluating extensive versus intensive margins for expanding output in Brazil. These alternatives are probably more pronounced in Brazil than in any other country in the world. Costs of colonization and of developing new areas can be estimated from some of Brazil's experience. Estimating

costs and returns from investments on the intensive margin appears more difficult, but approximations will be attempted.

Possibly one quarter of the leader's effort in the next half year may be related to the analysis of changes in output. Attention will be given to resolving some still unsettled procedures, and obtaining data needed to estimate allowances for intermediate production.

The work Mauro Lopes has been doing on credit may broaden into further study of Brazilian institutions which have been linked with agricultural development (somewhat in the manner of the Taiwan report authored by Hsieh and Lee). Also, this work may extend into the land development phases.

D. Colombia

Work in Colombia started actively at the end of December 1966, with arrival of Dr. L. Jay Atkinson, the project leader. Atkinson's work in Colombia is expected to continue until about March 1969. Dr. Atkinson's work in Colombia is associated with the Ministry of Agriculture, Planning Office, under a Memorandum of Understanding with the Government of Colombia.

E. Greece

Dr. Lawrence H. Shaw was project leader in Greece. He was in Greece from April 1964 to April 1966. In August, 1966 he completed and submitted a detailed and a summary draft report, at which time he resigned his position with ERS to accept an assistant professorship at Vanderbilt University, effective September 1, 1966.

Dr. Shaw is expected to complete a revised manuscript of the Greek study early in 1967. Stanley Krause has provided assistance in collecting needed data,

and will continue to assist in this and other ways especially on chapters dealing with how and why changes were made.

F. India

Work in India started actively in February 1966 when the ERS leader, Dr. William E. Hendrix, had arrived in India and completed orientation. Dr. Hendrix will complete a draft report on Indian Agricultural Development about August 1968.

Activities on the India phase of the study from July to December, 1966 centered on further development of basic background information, further development of study plans, and development of preliminary reports on particular phases of the study.

Primary emphasis in developing background information was put on developing comparable measures of agricultural production and changes on a district-wise basis in the Punjab, Uttar Pradesh, Orissa, Madras, Bihar and Mysore States. District-wise measures of crop area, production, and yields and of growth rates for the years 1952-53 to 1964-65 were developed on a crop by crop basis, for major crop groups, and for all groups for both Punjab and Madras States. Compilation of the data required for such index numbers and growth rates was completed for the other four above mentioned States. Calculation of index numbers is in process.

As district-wise production data and growth rates are developed for a State, Dr. Hendrix and his colleagues will prepare separate reports containing the basic data and analysis of factors associated with inter-district differences in rates and patterns of agricultural output growth.

A review draft of such a report was completed for the Punjab. It was found that one district, Bhatinda, with a population larger than many entire nations,

increased its output at the linear rate of 11.3 percent per year over the 1952-53 to 1964-65 period. Yield increases in this same district averaged 10.2 percent a year.

Madras State has two very high growth districts, North Arcot with a linear rate of growth of 7.9 and Ramanathapuram, 7.6 percent. These two districts combined have in them nearly 700,000 cultivator families or farms, roughly one fifth as many as we have in all of the United States. Within Madras, Coimbatore District shows food grain crop yield increases averaging 9.4 percent a year. These are outstanding gains to be achieved within a large nation plagued with critical food shortages. Interestingly, they have been achieved within the general administrative framework applying to all of India.

During the next six months, efforts will be spent on developing district-wise production indices and growth rates for the other four States indicated above and possibly for all other States, depending on available resources.

The work will combine on the all-India and Inter-State analysis as well as on study of interdistrict differences in Punjab and Uttar Pradesh in North India and in Madras and Orissa in South India. Tentative plans are to initiate more intensive study of local areas of rapid and slow growth.

Plans are to develop separate State reports. It is recognized that none of these reports probably will fully encompass what is ultimately hoped to be accomplished in State analysis. A final product is envisioned wherein these separate parts will be further developed and carefully integrated into an all-India analysis.

G. Mexico

Work in Mexico became actively underway in January 1965 under the leadership of Reed Hertford. Mr. Hertford is expected to return from Mexico about June 1967.

Principal activities under the Mexico phase of the productivity study from July to December 1966 are as follows:

Headquarters of the Mexican project recently was moved from downtown Mexico City to Chapingo, State of Mexico, some thirty miles away. The National Agricultural School and other Mexican Government dependencies are now located there under a plan for the centralization of the activities of the Mexican Secretariate of Agriculture (SAG), which was sponsored by Rockefeller, AID, Ford, International Development Bank, and SAG under the name of "Plan Chapingo".

This has brought the project into closer contact with the only other center of agricultural economics in Mexico--the postgraduate Centro de Economía Agrícola, Chapingo, presently being benefitted by a project undertaken between Iowa State University and the Ford Foundation.

Luis Aguirre, one of the Mexicans working on the project, presented his thesis, "The Demand for Fertilization in Country of Tesechoacan, Veracruz," in August. His data were obtained from eighty-eight questionnaires taken on farms in that tropical and more traditional region of Mexico Agriculture. The results obtained will be useful to the overall Mexican Project.

Ing. Sandval, another Mexican assigned to the project, as part of his thesis, completed a rather extensive questionnaire, on 170 farms in the Pacific North Region of Culiacan, Sinaloa in October. The analysis is directed at the determinants of fertilizer demand and adoption. His work is to be completed by February, 1967

at which time he intends to enroll in the Master's Program of the Centro de Economía, Chapingo.

In December, Lic. Gonzalez completed his thesis work for the National University under the auspices of the Mexican Phase B Study. The topic he undertook complemented directly the data content and overall analysis of cotton production in Mexico, reflected in the draft Chapter VII report submitted in December.

Ing. Mateo Vasquez, recently returned to INIA from the Master's program in Economía at Iowa, is now working for the Phase B Project on the demand aspects of Mexico's four basic subsistence crops--corn, beans, wheat, and rice, in accord with the Project's interest in these commodities. This complements work done under a contract with Iowa State University.

In November Lee Fletcher, project leader of the Iowa State Contract presented to members of the FDI/USDA, the Plan of Work for this latter project in which he described the work that Bernard Sanders is carrying out. Two progress reports on this contract have been received and the work is moving well and on schedule.

Two progress reports have likewise been received from Lic. Suarez for the work on Capital Formation in Mexican Agriculture mentioned in ERS'S Sixth Progress Report to AID.

Dr. Finis Welch went to Mexico for about one month in mid-year and worked on livestock data necessary to the Phase B Mexican Study. The report of this contract was submitted in September. This report includes data on population, slaughter, and hoof-weight of beef cattle, pigs, goats, and sheep, and price data on these species. Data were compiled on an annual basis from 1940 through 1962. Data on farm slaughter were found to be incomplete and subject to error, and those on

chickens unavailable. The estimates this report includes of livestock production shed light on a sector of Mexican Agriculture heretofore practically unknown by reason of the great divergencies in the available, official data.

Lic. Suvencio Wing submitted a progress report in October covering his work to that date on Mexican fertilizer consumption for the period 1940-64. National consumption estimates were provided in the report. A second report was submitted in December covering regional consumption data in Mexico for the period 1950-64.

During November and December several different groups of U.S. legislators visited Mexico, and Hertford participated in their briefings on the agricultural sector. He developed three short papers which were presented respectively to Congressman Reuss, Congressman Whitten, and Assistant Secretary Lincoln Gordon of the Department of State. These same papers were used in the briefings of other visiting legislators.

In November Hertford presented an invited paper in Guadalajara, Jalisco, to a seminar sponsored by the Centro de Investigaciones Agrícolas. In December he presented another paper to a seminar organized in the Department of Economics, Southern Methodist University.

During the first week of December, Mr. Gregory visited the Mexican Phase B Project for five days and discussed with Hertford the Chapter VII draft of his overall report, reviewed the progress of the project, and spoke with Mexicans attached by INIA to the ERS Study about their work. Dr. Atkinson, enroute to begin his duties as leader of the study in Colombia, stopped briefly in Mexico City during the time Mr. Gregory was there. This brief contact by Dr. Atkinson with the Mexico study will be useful in starting his work.

H. Nigeria

Work in Nigeria has been actively underway since the arrival of the ERS leader, William P. Huth, in October 1965. Herbert Kriesel, (a former USDA employee) is employed by Economic Development Institute, University of Nigeria as the contribution of EDI to the project. Mr. Gregory plans to travel to Nigeria in February 1967. Plans and a time schedule for completing the project in Nigeria will be considered as he confers with Mr. Huth, Mr. Kriesel, and others in Nigeria.

The main emphasis of the Nigeria project is on collection of village data on both production and consumption activity, and analysis of these data on a cross-sectional basis. Satisfactory data are not available for time series analysis. Plans and specific objectives of the village survey work were presented in the sixth progress report.

Unfortunately with the political disturbances in the country and the ensuing insurmountable obstacles to effective communications, it became necessary to discontinue the village survey in the Northern Region as of November 1, 1966. From that date therefore the study has been conducted in 18 villages of the Southern Regions - eight in the East, eight in the West and two in the Midwest, 30 farmers in each village.

Newly appointed officials in the Federal Office of Statistics apparently are even more anxious than their predecessors to co-operate in this project. So far, however; it is not known how adequate the data from the Federal Office of Statistics villages on production aspects will be and whether the data will lend themselves to the same kind of analysis as the data from all the non-FOS villages. The second

problem here is in co-ordinating the programming procedures in a manner to minimize the conversion problem in making data exchangeable.

The following additional activities have begun or will be started shortly:

- 1) Two additional villages in the Ibibio area of the Eastern Region will be added with three enumerators to be placed in each village. These two villages have been studied in recent months by the AID sponsored Diffusion Project carried out by Michigan State University, and thereby some basic data have been provided with respect to the receptivity of the people to new innovations.
- 2) A third person will be added by EDI in the original eight non-FOS villages of the Southern Regions. The purpose of this person will be primarily to gather more exact data concerning inputs, especially of labor, on individual plots of land growing specific crops. Secondly, this person will help in sharing the work load particularly in the plot surveys (to obtain areas) and in carefully enumerating the harvest of individual plots.
- 3) The various schedules used in the productivity survey have been somewhat revised in a manner to provide comparability with 1966 data and an expansion to cover some of the other aspects such as the institutional characteristics of the study villages.
- 4) Arrangements have been made for the employment of a research assistant to concentrate on the inputs of research and extension throughout the Southern Regions of Nigeria.
- 5) The collection of village data on production and consumption will be continued for a somewhat longer period in order to obtain data for the complete 1967 crop year. The more precise data to be obtained regarding individual crops

and plots (see No. 2 above) will compensate substantially for the fact that the survey in 1966 was started three to four months after the beginning of the crop season. Incidentally the return of Easterners following the disturbance in the North has made available substantially higher caliber personnel for this survey in the Eastern region.

I. Taiwan

Work in Taiwan under ERS leadership was underway from June 1964 to July 1965. Dr. David Spaeth was the ERS leader in Taiwan. The Chinese co-sponsors of the project completed and published a separate report entitled "Agricultural Development and Its Contribution to Economic Growth in Taiwan," authored by S.C. Hsieh and T.H. Lee.

As reported in the sixth progress report, it was decided to substantially revise the draft report prepared by Dr. Spaeth, and to enlarge upon some parts. These changes will require 60 to 90 days of work in Taiwan to collect additional needed data. Dr. Raymond P. Christensen, Deputy Director of Foreign Development and Trade Division, ERS, has undertaken responsibility to complete the Taiwan study. He plans to complete study of available material early in 1967, travel to Taiwan about mid-March, and complete a revised manuscript about mid-1967.

IV. Personnel Changes

A. Dr. Lawrence H. Shaw, leader of the Greek Study, resigned in August to accept a position at Vanderbilt University. However, Dr. Shaw continues his work to complete a report of the Greek study for ERS publication.

B. Dr. L. Jay Atkinson was employed in September 1966 as leader of the Colombian study. Dr. Atkinson studied at the University of Arkansas, Texas A. and M. University, and Iowa State University. From 1938 to 1942 he was Assistant Professor, Department of Economics, University of Connecticut. From 1942 to 1945 he was with BAE, USDA, engaged in analyzing various agricultural input-output relationships. From 1945 to 1966 he was with the Current Business Analysis Division, Department of Commerce, rising to Assistant Chief. He contributed articles to the Survey of Current Business on the role of the agricultural sector in U.S. economic growth, and was editor of the Survey of Current Business for 4 years.