

CHAPTER 7.

Census of Agriculture in Puerto Rico

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INTRODUCTION

Historical Background

The Bureau of the Census conducted its first enumeration of agriculture in Puerto Rico in 1910; from 1910 through 1950, censuses of agriculture in Puerto Rico were carried out every 10 years in conjunction with the decennial censuses of population. Congress authorized quinquennial enumerations of agriculture in the United States in 1915 (although the first census of agriculture independent of the population census was not carried out until 1925), but neither Puerto Rico nor the outlying areas (see ch. 8) were included in this quinquennial program until 1964. The Puerto Rico Reconstruction Administration conducted a special enumeration of agriculture on the island in 1935, but this was entirely a local effort.

Congress changed the dates of the agricultural censuses in 1952, requiring that they be taken every 5 years for years ending in "4" and "9." Puerto Rico was not included in the 1954 Census of Agriculture, but the 1960 agriculture census collected data for the 1959-60 crop year—approximately the same agricultural production year as the census for the 50 States (the agricultural enumeration for the United States proper began in October 1959 and covered the 1959 production year). Puerto Rico became part of the regular quinquennial agriculture census cycle in the 1964 enumeration. In 1972, Congress again altered the census schedule, this time to bring the economic and agriculture censuses into conjunction. The economic censuses covered years ending in "2" and "7," so the Bureau shortened the intercensal period following the 1974 and the resulting 1978 censuses of agriculture by 1 year. This was done to avoid gaps or a serious distortion of the agriculture census data series while providing for "simultaneous" economic and agriculture censuses for 1982.

For Puerto Rico, the convergence of the censuses came somewhat earlier—at least in part. For the 1978 Census of Agriculture in the Commonwealth, the Bureau decided to take

advantage of the presence of office staffs and facilities from the 1977 Economic Censuses, which had been carried out in the first half of 1978, and advanced the schedule for the 1978 agricultural enumeration by a full year. (The enumeration normally would have been carried out in the summer of 1979, just as the data collection for the census in the 50 States was being completed.) The Bureau made similar arrangements for the 1982 census, although the change in the timing of the agriculture census meant that for 1982, the enumeration in Puerto Rico was carried out in the summer of 1983, just as the census of the 50 States was being completed.

Legal Authority and Special Agreement

The conduct of the 1982 Census of Agriculture in Puerto Rico was governed by the provisions of Title 13, United States Code, and the relevant acts of the legislature of the Commonwealth of Puerto Rico, providing that these do not conflict with Federal regulations. The Director of the Bureau of the Census and representatives of the Government of the Commonwealth of Puerto Rico signed a special agreement in February 1983 that established the functions and responsibilities of the Bureau and the Commonwealth Government in the census of agriculture. The Bureau of the Census had final responsibility for planning and carrying out the census, including the appointment of a supervisor and of Bureau personnel as advisors and liaison with the census, recruitment and training of the census staff, and maintenance of confidentiality. The Commonwealth Government agreed to provide, without charge and so far as possible without disruption of its normal operations, space in Extension Service and Puerto Rico Department of Agriculture offices for testing prospective census employees and training enumeration personnel, and to assist in recruiting staff for the field enumeration and in publicizing the census. The Bureau of the Census retained final authority to determine the content and design of the report forms, enumeration procedures, tabulations to be made, and data to be published, but agreed to consult advisory committees and the interested agencies of the Government of Puerto Rico on these matters. The Bureau of the Census bore the entire cost of the basic census program.

Definition of a Farm

The definition of a farm for census purposes in Puerto Rico had remained relatively unchanged for some time prior to the 1982 census; it had required data be collected and published for places of 3 or more cuerdas¹ where agricultural products were grown, other than vegetables for home consumption, or that had livestock or 15 or more poultry, together with places of less than 3 cuerdas if their gross sales of agricultural products during the census year, or expected gross sales in the following year, were \$100 or more. For 1982, the Bureau of the Census introduced a new definition based primarily on sales of agricultural

¹A cuerda is .97 of an acre.

production. For the 1982 Census of Agriculture, a farm was any place that had, or normally would have had, sales of \$500 or more of agricultural products during the 12 months between July 1, 1982, and June 30, 1983, or that had 10 cuerdas or more from which \$100 or more in agricultural products were sold, or normally would have been sold, between July 1, 1982, and June 30, 1983. This brought the definition of a farm in Puerto Rico closer to that used in the 50 States, where the status of any place as a farm was determined by value of sales of agricultural products.

Planning

Planning—Planning for 1982 began as early as mid-1980, when Census Bureau officials met with members of the Puerto Rico Planning Board to discuss data needs and enumeration methodologies. Budget restrictions compelled the Bureau in mid-July 1980 to suspend all preliminary preparations for the Puerto Rico census. The Bureau reinstated full preparatory operations in November 1982, and Census Bureau representatives met again with Commonwealth officials to draw up the special agreement covering the two parties' responsibilities in the enumeration (see above for details of the agreement), and to begin organizing the census effort.

General plan of the census—The 1982 Census of Agriculture in Puerto Rico was primarily a field canvass, but the Bureau prepared a list of "special" farms—i.e., "large" operations with \$10,000 or more in sales, or with 50 or more cuerdas identified from the 1978 census records. These farms would be mailed report forms, together with an information booklet and a cover letter requesting the recipient to complete the report form and hold it until an enumerator picked it up during the field enumeration in July and August. (If an enumerator *did not* pick up the report form, the respondent was instructed to mail the completed questionnaire to the Census Bureau office at Hato Rey, PR.) "Regular farms" would be enumerated by enumerators who canvassed each farm and completed a report form using information supplied by the operator.

To reduce respondent burden, the Bureau planned to use sampling to collect selected detailed economic data. All farms were to be requested to supply basic inventory and production data, while special farms (including any identified during the general field enumeration) were asked additional questions covering expenses, use of chemicals, and so on. Statistical procedures would be used to expand the data to provide totals at the municipio level in the published tabulations.

The Bureau also planned to introduce the use of microcomputers for certain processing operations in the Puerto Rico central office. The microcomputers would be used for some clerical operations, preliminary edits, and tallies of selected crops, while the detailed tabulations would be done on the mainframe computer at the Bureau headquarters in Suitland, MD.

Census schedule—After census preparations were resumed, Bureau staff drew up a schedule for the census. The planned and actual beginning and completion dates for the major activities of the census were as follows:

| Activity | Beginning | | Completion | |
|--|-----------|--------|------------|--------|
| | Planned | Actual | Planned | Actual |
| Design report forms | 11/82 | 11/82 | 3/83 | 2/83 |
| Print report forms | 1/83 | 2/83 | 3/83 | 2/83 |
| Prepare special farms mail list | 12/82 | 12/82 | 5/83 | 4/83 |
| Prepare maps | 11/82 | 11/82 | 3/83 | 2/83 |
| Memorandum of agreement with the Commonwealth Government | 11/82 | 11/82 | 1/83 | 2/83 |
| Prepare enumeration materials | 11/82 | 11/82 | 5/83 | 5/83 |
| Establish agriculture census office in Puerto Rico | 3/83 | 3/83 | 3/83 | 3/83 |
| Mailout to special farms | 6/83 | 5/83 | 6/83 | 6/83 |
| Recruit enumerators | 5/83 | 4/83 | 6/83 | 7/83 |
| Train enumerators | 7/83 | 7/83 | 7/83 | 7/83 |
| Field enumeration | 7/83 | 7/83 | 8/83 | 9/83 |
| Close agriculture census office | 9/83 | 9/83 | 9/83 | 9/83 |
| Processing | 7/83 | 7/83 | 11/84 | 5/84 |
| Publication | 11/84 | 6/84 | 12/84 | 7/84 |

PREPARATORY OPERATIONS

Report Forms

The Bureau developed a single report form for use in the Commonwealth, the form 82-A1(PR)SP. The questionnaire was a single 22" x 14" sheet of white stock, with printing and shading in green ink, folded to 11" x 14" with four numbered pages. The standard version of the form was in Spanish (the "SP" suffix on the form number) and was used for both the mailing to special farms and the field enumeration. An English-language version of the form (printed on green stock with printing in black ink) also was produced.

The report form consisted of 26 sections in all. All farm operators were requested to provide data on the following subjects in sections 1-20:

- Land owned and/or rented/leased from others
- Land rented/leased to others
- Location (barrio and municipio) of land operated
- Cuerdas and amount harvested of selected crops
- Value of sales of selected crops
- Land use
- Irrigation
- Livestock and poultry inventory and sales, including livestock and poultry products
- Organization
- Farm-related income (from other than sales of agriculture products)
- Operator characteristics

Sections 21-25 requested additional information from "large" and "sample" farms covering—

- Products for home consumption
- Use of chemicals (pesticides, herbicides, fungicides, insecticides, and lime)
- Expenses
- Machinery and equipment, buildings and facilities
- Hired workers, including *agregados*² and sharecroppers

Section 26 requested identification information on the person completing the report form. (A facsimile of the form 82-A1(PR)SP is reproduced in app. C.)

²An *agregado* is a member of a family living on a farm not operated by any member of the family. An *agregado* might or might not be an employee of the farm operator and might or might not produce any agriculture products. An *agregado* might own, rent, or use rent-free the house he/she lives in. The land operated by, livestock belonging to, and the products marketed by an *agregado* are included in the totals of the farm operator in charge of the place on which the *agregado* lives.

Inventory data, as well as information on machinery and equipment and on *agregados* or sharecroppers on the place, were collected as of July 1, 1983. Other data were requested for the 12-month period from July 1, 1982, through June 30, 1983.

A total of 55,000 form 82-A1(PR)SP (Spanish language) questionnaires were printed, together with 700 English language versions (form 82-A1(PR)). The Spanish version was used in the field in conjunction with the form 82-A5(PR) Record Books, of which 1,200 were printed. In addition, there were 8,100 form 82-A1(PR)SP-L1 cover letters, and a like number of form 82-A1(PR)SP(I) Instruction Booklets produced for use in the mailout to "special" farms. (For details of the field enumeration and special-farms mailing, see pp. 47-48.)

Field Organization and Training

General organization—A local office staff carried out the 1982 Census of Agriculture in Puerto Rico—a combined mail/field enumeration—with supervision and assistance from Bureau headquarters and the Atlanta regional office. The Bureau's Field Division had primary operational responsibility for the field enumeration, although Agriculture Division's Outlying Areas Branch compiled the list of special farms and the Data Preparation Division mailed out the report forms. A member of the Field Division staff who had resided in Puerto Rico managed the 1982 Economic Censuses and the 1982 Census of Agriculture in Puerto Rico, while the Agriculture Division assigned members of its staff to serve as technical advisors and reviewers during the agricultural enumeration, followup, and processing in Puerto Rico.

The Bureau of the Census opened its Puerto Rico office in November 1982, when space was acquired in the Hato Rey Federal Building. This office and its staff were concerned first with the preparations and conduct of the 1982 Economic Censuses in Puerto Rico; but from mid-April 1983, when the economic field enumeration was completed, the office became increasingly involved in agriculture census activities. The office space was contracted for by the General Services Administration (GSA), and office equipment either was provided by GSA or rented locally.

Recruiting and training—Many of the office clerical staff and the field operations assistants were carried over from the economic censuses to the agriculture census staff, but the agriculture census also required a field staff of approximately 70 crew leaders, 50 quality-control (QC) enumerators, and 700 enumerators. Recruiting for the field enumeration staff began in April 1983 with hiring based on the results of written tests. The field operations assistants began administering the tests in mid-April. By the beginning of June some 5,600 applicants had been tested and the staff was selected from qualified applicants with the highest overall scores.

Crew leaders had been selected by the first week of June, and the field operations assistants conducted a 3-day crew leader training course during the period June 3-9. The crew leaders then were responsible for training the enumerators for their own crew leader districts (CLD's) during the 3-day period of July 11-13. By July 13th the recruiting and training effort was complete and the enumeration began.

The census staff were salaried temporary employees of the Bureau of the Census and were paid on standard U.S. Government GS pay scales for the appropriate grades.

Training and reference materials—The Bureau's Agriculture and Field Divisions prepared a series of training and reference guides

for use in the agriculture census in Puerto Rico. The two principal administrative guides used in the field office were the Administrative Manual (form 30(PR)SP) and the Office Procedures Manual (form A46(PR)SP). The Crew Leaders' Training Guide (form A53(PR)SP) and Crew Leaders' Manual (form A7(PR)SP) served as the training and general reference sources for crew leaders. The Enumerator's Manual (form A10(PR)SP) and Enumerator's Training Guide (A52(PR)SP) were the basic procedural volumes used to instruct the field staff. The Enumerator's Manual was the principal reference source for enumeration in the field and was included in each enumerator's kit. (See below.)

All of these materials were prepared in English, then translated into Spanish at Bureau headquarters. The various guides and manuals were printed by private contractors to Bureau specifications.

Maps

The census office and field staffs needed detailed maps of the Commonwealth to facilitate complete enumeration. Three kinds of maps were produced: (1) a master map for use in the census office, (2) crew leaders' maps, and (3) enumeration district (ED) maps for each of the 885 ED's. (The ED's were delineated by the Bureau of the Census and were identical to those used in the 1980 population census—i.e., they corresponded to the local *barrios*—except in the city of San Juan, where the five 1980 ED's were consolidated into two for the agriculture census.) The ED maps were inserted into the A5 Record Book for each ED.

Publicity

The public information campaign for the 1982 agriculture census in Puerto Rico served two major purposes: Recruiting the census staff and publicizing the census to encourage cooperation and response. The Bureau's Public Information Office (PIO) and Agriculture Division cooperated in the design and production of a poster announcing the census and that job applicants were needed. In April, 2,600 copies of the poster, each with 10 job-application/reply cards attached, were shipped to the Commonwealth for distribution through local government offices and by the census office staff. A census flyer, announcing the census of agriculture and urging cooperation in the enumeration, also was prepared and 40,000 copies were shipped to the Hato Rey office in the first week of May. The central office distributed supplies of the flyers to the Puerto Rico Department of Labor and to the municipio offices of the Puerto Rico Department of Agriculture Extension Service. Enumerators also were provided with copies of the flyers as handouts for distribution to local businesses in their ED's.

Broadcast media also participated in the publicity program. A set of four 20-second, one 30-second, and one 60-second radio spots was distributed to 95 radio stations in the Commonwealth for broadcast as public service announcements.

In addition, a 30-minute videotape discussion of the census by Bureau of the Census staff and officials of the Puerto Rico Extension Service was sent to three Puerto Rico television stations. All of these materials, developed initially by the Bureau's Agriculture Division and PIO, were translated and recorded at Department of Commerce facilities in Washington, DC.

As in the 1978 census, the Bureau asked the Governor of Puerto Rico to issue a formal proclamation of a census day or week. The proclamation was prepared and signed, declaring July 11, 1983, "Census of Agriculture Day," and the Governor of the Commonwealth presented the proclamation to the Bureau's Assistant Director for Economic and Agriculture Censuses in a formal ceremony shown on television throughout Puerto Rico.

FIELD ENUMERATION

Taking the Census

Enumeration portfolios—The enumerators were provided with enumeration portfolios containing the forms and records required for the census. Each portfolio contained a map of the enumeration district (ED) assigned to that enumerator, a supply of forms in Spanish (82-A1 (PR)SP), the form A10 Enumerator's Manual, and the form A5 Record Book. The ED map showed boundaries of the ED outlined in heavy orange lines, as well as the principal surface features and roads within the ED. The enumerator was to complete a report form for each farm within the ED (the Spanish language form was the "standard"). The form A5 Record Book included form A3(PR) listing sheets and a supply of form 82-A4(PR) nonresident operator/closeout data cards. The A3 listing sheets served as a record of the canvass of the ED and contained a series of screening questions for use in identifying households operating a farm, with space for listing each household canvassed. The A4 cards were used to obtain certain basic information about nonresident operators and for households the enumerator was unable to enumerate.

The cover for the A5 Record Book served as the enumerators' progress report. At the end of each week of enumeration, the enumerator completed a column in part 1 of the cover with the date, the number completed to date of (1) A3 lines (i.e., households canvassed and either enumerated or identified as out of scope), (2) A1 report forms, and (3) A4 cards, as well as hours worked.

Field enumeration procedures—Enumerators used two canvassing procedures in the field enumeration—procedure A for predominantly rural ED's and procedure B in urbanized ED's. Procedure A was a door-to-door canvass of every household in the ED, except in built-up residential areas designated as "clusters."

A cluster was any group of 25 or more houses, buildings, or other structures, with each house or dwelling on half a cuerda or less of land. When enumerators found clusters not already shown on their ED maps, they outlined them on the ED maps, assigning a code letter ("A," "B," "C," and so on, in sequence), and enumerated the cluster by trying to identify the persons living there who operated farms, and visiting those addresses.

Procedure B was used for urbanized ED's or for ED's in which 10 or fewer farms had been enumerated in the 1978 Census of Agriculture in Puerto Rico. For procedure-B ED's, the names and addresses or name alone of farm operators located in the ED were prelisted on the A3 Listing Pages in the Record Book for the ED, and enumerators visited each prelisted address. In addition to completing report forms for places qualifying as farms, enumerators asked respondents whether anyone else in the area operated a farm and visited any places mentioned that were not already listed.

In both procedures, enumerators began each interview by asking the name of the head of the household, and a series of screening questions to determine whether the place qualified as a farm and help classify the operation by size. Respondents first were asked if, in the previous 12 months, they had raised, produced, or sold any crops, vegetables or ornamental or flowering plants, or had any livestock or poultry. An affirmative answer meant a completed questionnaire might be required, and the enumerator proceeded to ask (1) whether the place had or expected to have annual agricultural product sales of \$400 or more, and (if not), (2) whether the place had 10 or more cuerdas and annual or expected sales of \$100. Enumerators assigned a farm serial number (beginning in each ED with 001, and

continuing sequentially 002, 003, and so on), a census file number (CFN—an .11-digit number consisting of the municipio and barrio numbers, the farm serial number, and a check digit [the check digit was assigned to each CFN during subsequent processing]) and completed a report form for each place qualified as a farm.

For places that qualified as farms, but contained no housing unit, or had operators who lived elsewhere, or for farms where no responsible person was available to interview after repeated callbacks (see below), enumerators completed a form 82-A4(PR)SP Nonresident Farm Operator/Closeout Data Card with name and address of the nonresident or absent operator and whatever basic information (e.g., cuerdas, kinds of livestock, types of crops) could be obtained from neighbors or other sources, and assigned an A4 serial number. Each A4 case was identified on the card as a "nonresident operator" or a "closeout" case. Enumerators gave copies of the A4 cards completed each week to their crew leaders, who referred the nonresident cases either to the appropriate enumerator or other crew leader responsible for canvassing the ED in which the farm operator lived.

As enumerators canvassed their ED's, they plotted on their maps each farm, nonfarm operator, cluster, and so on. This enabled each enumerator, as well as the responsible crew leader, to monitor the canvassing of their ED's.

Callbacks—Callbacks were additional contacts with a household after an enumerator's initial visit. Enumerators made callbacks to addresses when they had learned from a responsible member of the household or neighbor that someone in the household, absent at the time of the first visit, had agricultural operations. Enumerators tried to schedule callbacks for a time convenient to the operator, and noted the appointment in the "callback" column of the A3 listing sheet for the line containing that address. The *only* purpose for making a callback was to complete an A1 report form for the address, and enumerators made no more than two callbacks to any household (i.e., three contacts altogether, counting the initial visit and two callbacks), after which they tried to obtain the necessary information from some other "eligible respondent," such as another responsible adult within the household who was familiar with the farm operation, or a foreman or hired manager who supervised the farm operations. Enumerators included callbacks in their regular work schedule and tried to make callback visits as soon as possible after the initial visit to avoid accumulation of delayed work.

Special Farms

Compilation of the special farms list and mailout—The 1978 agriculture census in Puerto Rico employed a two-stage enumeration procedure, involving a precensus farm identification mail survey and attempted enumeration of "large farms" to determine their current agricultural status and address, and a field enumeration of all other farms. The Bureau defined a "special farm" in Puerto Rico for the 1982 census as any place with expected annual agricultural product sales of \$10,000 or more, or with 50 cuerdas or more. The special farms mail list was compiled in April 1983 from the 1978 farm list for Puerto Rico; a total of approximately 4,200 addresses that met the criteria as special farms based on their 1978 census records were identified and listed.

Time constraints prevented repetition of this mail enumeration of special farms attempted in 1978. The mail operation had not, in any event, been a great success; the Bureau obtained

only an approximate 16-percent mail response from addresses on the mail list, the rest had to be enumerated by field interview. For 1982, the Bureau planned a variation of the two-phase enumeration; special farms once again would be identified and mailed report forms, but respondents would be asked to complete and hold them until a field enumerator stopped to pick them up.

The Bureau's Jeffersonville, IN, office prepared mailing packages, each consisting of a report form 82-A1(PR)SP, a form 82-A1(PR)SP(I) Information Booklet, and a form 82-A1(PR)SP(L1) cover letter requesting the respondent to complete and hold the report form until an enumerator stopped to pick it up. The special farms packages were mailed directly from Jeffersonville on June 1, 1983.

Field followup—The special farms were visited and enumerated by census interviewers in the course of their regular canvassing. Special farms in each enumeration district (ED) were prelisted on the A3 listing sheets attached to the A5 Record Book for each ED, and enumerators were directed to visit and complete a report form for every address listed.

Field Review and Quality Control

The quality control plan for the 1982 enumeration was similar to that used in 1978, consisting of (1) a period of observation of selected enumerators' work, (2) a field review of each enumerator's work, and (3) a coverage check made by matching enumerators' farm lists to prelisted addresses in each ED.

The crew leaders were responsible for the field quality-control effort. Each crew leader selected the four enumerators he or she considered most likely to have difficulties in completing their work and spent approximately one-half day with each as they canvassed their ED's. The crew leaders made notes of procedures the enumerators completed well, and of any for which the enumerator required retraining. The enumerators were retrained as necessary. No enumerator selected for observation began canvassing without supervision until the enumerator had demonstrated to the crew leader the capacity to adequately perform the job.

Crew leaders carried out formal reviews of the enumerators' completed work at the weekly meetings with each and again at the completion of the canvass of each ED. These reviews were concerned primarily with proper canvassing and enumerative techniques and consisted of five basic steps:

1. Matching check of lines on the A3 listing sheets to the ED map to ensure thorough canvassing.
2. Checking A3 listing sheets and A4 nonresident operator cards to make certain they were filled out correctly, completely, and legibly.
3. Matching completed A1 report forms to the A3 listing sheets to ensure each listed farm had been enumerated.
4. Checking the report forms for completeness and legibility.
5. Checking procedure-B (see above) and special-farm listings to make certain they were visited.

The crew leader discussed any problems with the enumerator concerned and arranged to observe enumerators that had difficulties to make certain they were applying all the canvassing procedures correctly. Crew leaders also carried out coverage checks of their CLD's at their weekly meetings with their enumerators.

Prior to the start of the enumeration, quality control (QC) enumerators visited the ED's and divided each into four "quadrants" for enumeration purposes. They then selected a

place at random in each quadrant of each ED, listed that place and the four succeeding places on the most likely enumeration route, and carried out short interviews to determine whether or not an A1 was required for each place. The crew leaders used these lists to check the coverage obtained by the regular enumerator. The QC enumerator joined the crew leader and enumerator(s) for each ED concerned at their weekly meeting until the enumerator(s) had covered each quadrant. The enumerators' A3 listing sheets were matched to the prelisted addresses for the part of each ED canvassed to that point. Prelisted addresses matched to the A3 listing sheets then were checked to determine whether a report form was needed, and whether one had been completed. For cases where a matched address had not been identified as a farm by the field enumerator, the QC enumerator revisited the address to resolve the question. The crew leader visited and completed a report form if necessary for any prelisted farms missed by one of his or her field enumerators.

Quality control checks indicated that the field enumeration staff generally obtained good coverage.

DATA PROCESSING

General Information

Prior to the 1982 census, the field offices established for the agriculture enumerations in Puerto Rico had served as the headquarters for the field enumeration and carried out preliminary clerical review of the report forms before shipping them to Bureau headquarters for detailed edit, computer processing, and tabulation. For the 1982 economic and agriculture censuses, the Bureau used a microcomputer system in the San Juan (Hato Rey) office to help process the report forms and reported data more quickly. In the agriculture census, the microcomputers were used to (1) check in reports for large farms, (2) key data to magnetic tape, (3) perform consistency edits, (4) provide totals of selected data items by municipios and for Puerto Rico and to aid in the detection of coverage problems, and (5) determine whether a given case met the criteria for a farm.

After the enumeration was completed and the data had been keyed to tape at the San Juan office, the tapes and the report forms were shipped to Suitland for further processing using the Bureau's mainframe computers. The data underwent detailed computer editing, tabulation, and final review and correction before publication.

Field Office Processing

Clerical operations—Report forms and other enumeration materials were sent to the field office for processing on a flow basis as canvassing was completed in each ED. The clerical staff first checked each enumerator's portfolio to make certain it contained an A5 Record Book, ED map, completed report forms, and other enumeration materials, and that all special-farm cases were accounted for. Incomplete portfolios were pulled from processing and the crew leader involved contacted and informed of any problem. Once corrective action was taken, the portfolio was returned to processing. The contents of accepted portfolios were removed and sorted. The A5 Record Books and A4 nonresident operator cards were stored for shipment to Suitland, while the report forms were sorted into special-farm and "nonspecial" farm categories. Clerks batched the sorted forms into work units of approximately 100 forms each; the special-farm batches were sent for check-in and then data keying, while the other batches were referred directly to data keying.

Check-in, data keying and microcomputer edit—The microcomputer system was employed for both check-in and data keying. Keyers received batches of report forms for check-in keying and entered the batch number for each batch, then the CFN (CFN's were preassigned to special farms cases, and were assigned by enumerators for other farms) for each report form. The computer program automatically checked each CFN to make certain it was a "legal" number—i.e., that the municipio and ED codes contained in the CFN were acceptable. Acceptable CFN's were added to the file, while keyers used the municipio and barrio information in section 1 of the report form to correct "illegal" CFN's.

After check-in, the work units were held by control clerks until data keying could begin. When each batch was released for keying, the data keyers entered the batch number for each, then the CFN for the first case. The computer program matched the CFN against the check-in file and, if the CFN had been checked in, accepted the record for data keying. The keyer then keyed the data on the report form, skipping blank data cells and entering the keycodes and responses only for cells containing information. The keying program provided performed a series of tests on the data as they were entered, checking for nonnumeric entries, illegal values (some items could be answered only with specified values or ranges of values), and checking for entries that were either too long or too short for a particular data cell. After the last item from the form had been entered, the keyer could review any item or the entire form. Any problem detected was corrected as necessary, after which the keyer entered the edit code. The edit routine reviewed the data keyed, flagged questionable items (i.e., set indicators recognizable by the computer and human reviewers that an item was incorrect or inconsistent with other information in the records), and displayed the flagged items on the microcomputer terminal's cathode ray tube (CRT) screen for the keyer's review. The keyer made any correction required and the data were re-edited. If the record failed the edit a second time, the keyer stored the record for an analyst's review and went on to the next report form in the batch.

Local tallies—As data were keyed, the computer system was used to compile weekly municipio and Commonwealth totals of number of farms and selected production items. These tallies provided a continuous progress report on census coverage for the Commonwealth and for each municipio, and gave the program manager the opportunity to identify local coverage problems.

Office closeout—The Puerto Rico census office was closed on September 30, 1983. During the last two weeks of September, the staff completed local processing of the report forms, and packed the report forms, review materials for use by Agriculture Division analysts, and the computer tapes containing the agriculture data. These materials were shipped to Suitland for complex computer edit and data tabulation.

Computer Processing

The microcomputer system in the census office in Puerto Rico had performed basic edits of the individual data records, but the detailed edits were done using the mainframe computers at the Bureau's Suitland, MD, headquarters. The data first had to be reformatted for use with the larger systems. The data were reorganized using a format program developed from specifications established by subject-matter specialists in the Agriculture

Division. The program allowed the computer to rearrange the data into workable computerized records and check each record for illegal items (usually keying errors), nonresponse to required items, negative values, out-of-scope records, and the correct check digit in the CFN of each record. Rejected records were printed out for analysts' review and correction. Formatted records, and records corrected and returned to the file, underwent a second, more detailed edit.

The second edit program consisted of an item-by-item check of each data record that—

- Made consistency checks (that is, matched reported data totals to the sum of reported data detail).
- Set flags for questionable items.
- Imputed data for missing or obviously incorrect entries or printed a code that indicated the type and location of the problem. These items were reviewed individually for accuracy and corrected, as necessary.
- Coded each record for size by cuerdas, economic class, type of farm, and age and tenure of operator.

A listing of flagged cases was printed out, the problem records reviewed and corrected by Agriculture Division analysts, and the corrections entered in the data record using key-to-tape encoders. The flagged records then were edited again by the computer. A flagged case might undergo several computer edits, as changing any given item could cause inconsistencies in related items, thus requiring further editing and correction, but no record was added to the data file until it had passed the edit. Once all the records had been edited and all the necessary corrections made, the data file was ready for tabulation.

Sampling and Statistical Adjustment

To reduce respondent burden, the detailed economic data in sections 21-25 of the report form were asked only of a sample of farms. The sample selected included "large" or "certainty" farms—i.e., those with sales of \$20,000 or more, or with 50 cuerdas or more—plus *all* farms in municipios that had fewer than 250 farms in the 1978 census, and a random 1-in-5 sample of all farms in municipios that had more than 250 farms in 1978.

During processing, the "noncertainty" sample farms were stratified into 128 strata, formed by creating 7 groups based on sales value, 10 on type of farm, and 3 on size of farm, and then cross-identifying operations to assign them to an individual stratum (e.g., a sugar farm of 10 to 19 cuerdas with sales of \$1,200 to \$2,499 was in a different stratum than one of 10 to 19 cuerdas with \$2,500 to \$4,999 in sales). The tabulating program made possible estimates of various items collected from sample farms by multiplying the data item for each sample farm by the sample "weight" assigned to that farm. The sample weight was determined by the ratio of sample farms to all farms in each stratum. "Certainty" farms then had a weight of 1, since all farms selected with certainty were part of the sample. Weights assigned to the other sample farms ranged from 1 to 10.

Tabulation

Agriculture Division subject-matter specialists prepared table layouts and specifications for tabulating the Puerto Rico census data. The Bureau used its general tabulating system (GTS) and table image processing system (TIPS II—for a discussion of TIPS II, see ch. 10) software packages, with the mainframe computers at Suitland, to prepare three sets of tabulations for publication: 15 tables of data for all farms in the Commonwealth;

53 tables for farms by municipio and for the 5 geographic regions (as delineated by the Puerto Rican Government); and 6 tables of more detailed data for farms in the Commonwealth with sales of \$2,500 or more, classified by tenure, type of organization, type of farm, size of farm, market value of products sold, and main occupation and age of operator.

Agriculture Division subject-matter specialists reviewed the tabulations as they were produced, using the Bureau's high-speed printer (HSP), for accuracy and consistency. The data corrections were shipped to the Bureau's Jeffersonville, IN, facility and keyed to the file.

COMPARABILITY OF DATA

To provide comparable historical data for publication in the 1982 census report, the Bureau revised data from the 1978 census to conform to the 1982 farm definition. Appendix B of the 1982 census report (see below) allowed data users to see the impact on the statistics of the change in definition by showing 1978 data for selected items under both the old and new definitions.

The use of sampling to collect selected data also affected the comparability of the statistics. To reduce respondent burden, only a sample of farm operators was asked to provide information on agricultural production for home consumption, chemicals used, expenses, machinery and equipment, and hired labor. (For details for the sampling procedures, see p. 49.)

Data collection for 1982 was carried out, as in the 1978 enumeration, by a combination of mail and personal interviews and had no significant influence on comparability. However, the

1969, 1974, and 1978 censuses had included data for some places of 3 cuerdas or less, and with sales of less than \$500, and this, together with variations in the timing of data collection in the various censuses, did have some effect on data comparability.

PUBLICATION PROGRAM

No preliminary report was published for Puerto Rico. The census data were published in July 1984 in Volume 1, *Geographic Area Series, Part 52, Puerto Rico*, which included statistics on all farms for the island as a whole, for five agricultural "regions," and for individual municipios. Tables 1-15 showed data for the entire island, tables 16-68 contained data by region and municipio, and tables 69-74 had more detailed information on farms with sales of \$2,500 or more. The data presented for all farms included farms; land in farms; land use; operator characteristics; organization; hired labor; agregados and sharecroppers; selected machinery and equipment; agricultural chemicals used; irrigation; selected production expenses; sales value of agricultural production; livestock, poultry, and their products; farm-related income; ornamental and flowering plants; products for home consumption; crops harvested; selected vegetables harvested for sale; and cultivated and/or improved pastures. For farms with annual sales over \$2,500, additional summary data were shown on tenure, organization, main occupation and age of operator, size of farm, market value of agricultural product sales, and types of farm.

The Bureau did not make available any unpublished data from the 1982 census in Puerto Rico.