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2002 CENSUS OF AGRICULTURE

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If you would like to learn more about the statistics available from NASS or have questions concerning this report, visit our Web site at www.nass.usda, send e-mail to nass@nass.usda.gov, or call the Agricultural Statistics Hotline at 800.727.9540.

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BACKGROUND INFORMATION

The United States Constitution is the vehicle that initiated the collection of agricultural census data. Article 1, Section 2, of the U.S. Constitution requires that a census of population be carried out every 10 years to apportion representation of each State in the House of Representatives. Even as the delegates to the convention that produced the Constitution discussed its various provisions, James Madison, its principal author, urged that the census be used for something more than just counting heads. Nothing came of his recommendations until 1810, after he had become President Madison. In 1810, the population census tried to collect information on manufacturing establishments as well as population, and included a single item asking whether the person interviewed was engaged in agriculture. Another 30 years passed before the census program included information on agricultural activities. The 1840 census attempted to collect more detailed information on manufacturing, mining, and agriculture, with limited success. Despite this, the value of agriculture data (and other detailed statistics) was so obvious that the census program was permanently expanded to cover economic and agricultural activities.

The agriculture census remained part of the decennial census program from 1850 through 1920. In 1915, Congress authorized the collection of agriculture data quinquennially, but it was not added to the mid-decade census covering the economic areas until 1925.

Through 1940, the U.S. Census Bureau carried out the agriculture census with the other economic censuses, but changed their respective schedules. The goal was to use the Census Bureau's resources more efficiently and to distribute the workload over periods between decennial censuses. By the 1950's, the agriculture census was providing information for years ending in "4" and "9", while the economic censuses covered years ending in "2" and "7" as reference periods. In 1976, Public Law 94-229 shortened the intercensal periods after the 1974 census to four years each, thus restoring the agriculture census to a schedule concurrent with the 1982 and later economic censuses. In 1997, Public Law 105-113 transferred the responsibility for conducting the 1997 Census of Agriculture and subsequent agriculture censuses from the U.S. Department of Commerce (DOC), Bureau of the Census, to the U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS).

The agriculture census is the only source of statistics on American agriculture showing comparable figures, by county, and classifying farms by size, tenure, type of organization, primary occupation, age of operator, market value of agricultural products sold, combined government payments and market value of agricultural products sold, and North American Industry Classification System code. The 2002 Census of Agriculture covered agricultural operations meeting the definition of a farm in the 50 States, Puerto Rico, Guam, Commonwealth of Northern Mariana Islands, the U.S. Virgin Islands, and American Samoa.

LEGAL AUTHORITY

The 2002 Census of Agriculture was conducted by the National Agricultural Statistics Service (NASS). Title 7 U.S.C., Chapter 55 (Department of Agriculture), sections 2204g and 2276, describe the type, frequency, methods, geographic scope, mandatory reporting requirements, and confidentiality requirements for NASS as they pertain to the census of agriculture. (See Appendix A for excerpts of Title 7 applicable to the agriculture census.)

USES OF AGRICULTURE CENSUS DATA

Agriculture census data are routinely used by: Congress; Federal, State, and local government organizations; the business community; scientific and educational institutions; and farm organizations.

The private sector, including businesses, farm cooperatives, commodity and trade associations, and utility companies rely on agriculture census data to develop plans for locating new plants, service outlets, and sales and distribution facilities. They also use it for allocating research resources, selecting marketing areas, and for other activities that provide better services to the farm community. Major farm organizations use census data to develop promotional materials on various segments of American agriculture.

Agriculture oriented magazines and news media use census results as technical background for stories and feature articles. In addition, census results can be used to estimate market share and identify the types of farms reached. A regional television station, for example, used agriculture census data to learn about farm operator characteristics and agricultural production levels in each of its markets which enabled its advertisers to target specific media markets for particular services and products.

Administrative and legislative bodies at all levels of government use census data in planning and analyzing farm and rural programs. The Congressional Budget Office uses agriculture census data to evaluate the farm income-support program. State and county agencies employ census statistics for land planning and zoning, to aid in evaluating environmental policy, profiling the States' labor forces, and economic planning.

Within the U.S. Department of Agriculture (USDA), NASS employs agriculture census statistics to develop benchmarks and comparisons for its current estimates, and to evaluate particular problems or situations. The Economic Research Service of USDA uses census of agriculture data to evaluate the current economic situation, and to monitor and measure structural changes and adjustments in the farm sector. When a new disease outbreak occurs, the Animal and Plant Health Inspection Service of USDA uses census data as a first profile of the commodity. The data provide information on where the commodity is grown or raised and help determine where to quarantine or limit distribution.

Other Federal government agencies use production, sales, size, and type of farm data from the census to calculate economic measures such as farm income estimates, indexes of productivity and price levels. Also, census data are used to calculate Federal disaster compensation, environmental assessments, and for special projects.

FARM DEFINITION

The definition of a farm used in the 2002 Census of Agriculture was any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. This definition was first used in the 1974 census and has been used in all subsequent censuses. The farm definition varies in each U.S. territory.

Initially a "farm" was defined by the Bureau of the Census for the 1850 agriculture census as any place with annual sales of agricultural products of \$100 or more. Though the definition changed several times since 1850 (see Appendix B) with new sales or acreage criteria, each definition required that the land involved must be used for or connected with agricultural operations, and must be operated under the day-to-day control of one principal operator or senior partner. While the 2002 census collected data for multiple operators for a single farm, the concept of the principal operator or senior partner was maintained. The reporting unit for the agriculture census has always been the individual agricultural operation, i.e., the farm or ranch.

Census results are based on data obtained from individual farm operators about their respective farms. Land comprising the farm need not be a single contiguous tract. It can consist of several separate pieces of land, so long as it was treated as a single operation. Specific rules cover farms with land in more than one county.

When land operated as a single farm was located in two or more counties, data are tabulated in the county containing the largest value of agricultural products raised or produced. In rare instances, where large amounts of land were found in two or more counties, a single report is separated into its respective counties.

The statistics collected in the census represent only those places with agricultural operations qualifying as farms according to the census definition.

The farm definition for Puerto Rico and the other outlying areas vary though all involve minimum levels of sales. Farm definitions were established in cooperation with the local governments.

The farm definition used in Puerto Rico was any place from which \$500 or more of agricultural products were produced and sold, or normally would have been sold, during the 12-month period between January 1, 2002 and December 31, 2002. The census form requested total land, land use, production, expenditure, farm labor, and sales data for the 12 months between January 1 and December 31, 2002. Data on inventories of livestock, poultry, machinery and equipment, buildings and facilities, and number of sharecropper and agregado families, were requested as of December 31, 2002.

The farm definition used for American Samoa was any place that raised or produced any agricultural product for sale or consumption by family members. Crop production, crop and livestock sales, production, and expense data were collected for the 12-month period between January 1 and December 31, 2003, and inventory data was collected for the day of enumeration.

The farm definition used in Guam and the Commonwealth of Northern Mariana Islands defines a farm as any place that had sales of agricultural products of \$1,000 or more. Enumeration began in January 2003, and collected acreage and inventories data (i.e. acreage, numbers of livestock and poultry, etc.) as of the day of enumeration. Crop and livestock production, sales, and expense data were requested for the calendar year 2002.

In the U.S. Virgin Islands, the farm definition remained the same as in previous censuses, and defines a farm as any place from which \$500 or more of agricultural products were sold. Enumeration began in January 2003 and collected acreage and inventories data (i.e. acreage, numbers of livestock and poultry, etc.) as of the day of enumeration. Crop and livestock production, sales, and expense data were requested for the calendar year 2002.

OVERVIEW OF CENSUS OPERATIONS

Scope and Reference Dates

The 2002 Census of Agriculture program collected and published statistical data for all agricultural operations meeting the farm definition in the 50 States, Puerto Rico, Guam, American Samoa, Commonwealth of Northern Mariana Islands, and the U.S. Virgin Islands. It also included special studies relating to farm irrigation and aquaculture.

For the 2002 Census of Agriculture (States), basic data were requested from all farms, while additional information was asked of a sample (i.e., all those with expected annual sales of agricultural products above a specified value, together with a random sample of all other farms) of about 22 percent of all farms.

The 2002 Census of Agriculture (States) requested inventory data (e.g., number of livestock) as of December 31, 2002, while production, sales, and other data (except a few crops, such as citrus, for which data were collected for the production year) were collected for the calendar year 2002.

Data Collection

Like all censuses of agriculture since 1969, the 2002 census was conducted as a mailout/mailback enumeration. An initial list of 9.1 million names and addresses from various sources including the 1997 census was assembled. After the removal of duplicate names and nonagricultural operations, the final list was reduced to 2.84 million. In December 2002, the report forms were mailed to the names and addresses on the final census list frame, with a cover letter asking recipients to complete the report form(s) and mail them back to the Census of Agriculture, National Processing Center (NPC) in Jeffersonville, IN. A toll-free number was provided on the initial report form and on follow-up mailings to assist respondents with questions. Mail and computer-assisted telephone follow-up to nonrespondents continued for six months (February 2003 through July 2003) after the initial February 3 census due date. Once an acceptable overall response level was achieved, NASS edited, reviewed, and tabulated the data. Estimates for record level nonresponse and coverage were factored into the final tabulations for each State.

Data Processing

NPC received mail returns for each of the 50 States, entered individual report data into the computer file, and resolved edit failures. Data analysis and resolution of questionable data and data relationships took place in the respective NASS Field Offices during the summer of 2003. Report forms from Puerto Rico were processed by the NPC. Report forms from Guam, the U.S. Virgin Islands, and CNMI were handled by NASS staff at headquarters. American Samoa report forms were processed by local staff.

Data Publication

There were two releases of census data, a preliminary and a final release. The preliminary release contained information on land in farms, i.e. number of farms and acres, and demographic data. It was released in February 2004. The final U.S. and State publications were released simultaneously in June 2004.

The 2002 Census of Agriculture provided data for more than 3,000 counties or county equivalents. In addition, selected data were tabulated and published at the five-digit ZIP Code level and for congressional districts from the 108th Congress. The United States includes all 50 States, while "county equivalents" include the parishes in Louisiana and the "census areas" in Alaska. State totals are aggregates of the county or county-equivalent totals, while the national totals are aggregates of the State data.

SPECIAL ENUMERATION AND FOLLOW-ON CENSUS ACTIVITIES

Citrus Caretakers

Between June 2002 and October 2002, a Citrus Caretaker Census, in connection with the 2002 Census of Agriculture, was again conducted in Arizona, Florida, and Texas. The goal of the census was to obtain citrus data from groves operated by citrus caretakers in the most efficient and accurate way possible.

American Indian Reservations Pilot Project (Montana, North Dakota, and South Dakota)

A pilot project to collect agricultural census data for farms and ranches on American Indian reservations was conducted in conjunction with the 2002 Census of Agriculture in Montana, North Dakota, and South Dakota. This was the first time agricultural census data for American Indian reservations based on individual farm and ranch reports have ever been published by the National Agricultural Statistics Service (NASS).

Prior to the 1997 Census of Agriculture, each American Indian reservation was treated as a single farm for census data collection and tabulation purposes. A single aggregate census report form was completed for each reservation to account for all American Indian controlled agricultural activity on each reservation.

The 1997 Census of Agriculture used slightly different procedures. In addition to an aggregate report form for each reservation, a separate report form was used that collected the total number of American Indian farm or ranch operators on the reservation. This form also collected a list of counties in which the reservation land was located, and the number of operators in each county. Procedures also allowed NASS to collect data from individual American Indian operators on reservations.

While preparing for the 2002 census, NASS received a recommendation from the Secretary of Agriculture's Advisory Committee on Agriculture Statistics to collect more complete reservation-level data on the 2002 census. In response to this recommendation and to honor a commitment to publish improved demographic data on American Indian operators, NASS conducted the 2002 Census of Agriculture pilot project in Montana, North Dakota, and South Dakota. These States were selected for the pilot project because there is a significant amount of agricultural production on their reservations. Also, the reservation agriculture is similar in size, type, and operating arrangements to non-reservation agriculture.

The intent of this pilot project was to measure total agriculture on farms and ranches that had at least some agricultural production on reservations during 2002. The pilot project implemented new methodology for the 2002 census in Montana, North Dakota, and South Dakota to eliminate the treatment of a reservation as a single American Indian farm or ranch.

Additional information regarding this pilot project and published findings can be found in the publication *American Indian Reservations—Montana, North Dakota, and South Dakota Pilot Project, Specialty Products Part 1, AC-02-SP-1* issued October 2004.

2003 Farm and Ranch Irrigation Survey

Selected irrigation data for on-farm irrigation operations have been collected in the census of agriculture since 1890. A census of farms reporting irrigation in the 1900 Census of Agriculture was authorized by Congress. Surveys of irrigation in humid areas were taken in connection with the 1954 and 1959 censuses. The 2003 Farm and Ranch Irrigation Survey was the sixth survey devoted entirely to data collection of on-farm irrigation operations in the United States. It was the second irrigation survey to collect and publish data for each of the 50 states. The 1979, 1984, 1988, and 1994 Farm and Ranch Irrigation Surveys used similar methods but published data only for leading irrigation States, with a U.S. total. The 2003 survey collected detailed information on water transfers and labor expenses for the first time.

The 2003 Farm and Ranch Irrigation Survey was one of two special studies provided for in the 2002 Census of Agriculture program. It supplemented the basic irrigation data collected from all farm operators in the 2002 census. The survey used a sample of operations from the 2002 census that reported using irrigation during the reference year to obtain detailed data about irrigation practices without increasing the response burden on all farmers. Data from the survey were published in November 2004 for all states and for the 20 water resources areas. Additional information about this survey is contained in Chapter 10, and Appendix D and E of this publication. Additional survey detail and results are included in the 2003 Farm and Ranch Irrigation Survey publication.

2005 Census of Aquaculture

The 2005 Census of Aquaculture was mailed to all known aquaculture producers in December 2005. Data were collected on water acreage, methods of production, total production, sales outlets, sales by aquaculture species, products distributed for restoration or conservation, and farm employment. The target population for the 2005

Census of Aquaculture was all commercial or noncommercial places from which \$1,000 or more of aquaculture products were produced and either sold or distributed during the census year.

This was the second national aquaculture census conducted by NASS. The first aquaculture census was conducted in 1998. Limited aquaculture data have been collected during the 5-year census of agriculture since 1974.

The aquaculture industry experienced tremendous growth during this time period as value of products sold increased from \$45 million in 1974 to over \$1.1 billion in 2002. According to the 1998 Census of Aquaculture, value of products sold was \$978 million. Additional information is contained in Chapter 11 and Appendix E in this publication. Data collected from the 2005 Census of Aquaculture were released in October 2006.

PROGRAM COST

The cost of the 2002 Census of Agriculture was approximately \$123 million. Over the five-year budget cycle, the funding varied from a low of \$15 million in fiscal 2001 to a high of \$41 million in fiscal 2003. Funding included cost for the census of agriculture and any associated follow-on studies. Funds for the 2002 agriculture census were considered “no year,” meaning unspent funds in a given fiscal year could be carried forward to the next year. Total cost of the 1997 census was approximately \$100 million.

Three separate contracts covered a significant portion of work for printing, data collection, and processing. Commercial vendors were used for printing and preparing mail packages. Data collection costs included a contract with NASDA for providing enumerators. Data processing costs included a contract with the National Processing Center covering handling mail returns and capturing data.

The table below shows funding by fiscal year for major program areas.

Table 1-1. 2002 Census of Agriculture, Full-Cycle Costs by Line Item

Line item	FY 2000 final ¹ (\$1,000)	FY 2001 final (\$1,000)	FY 2002 final (\$1,000)	FY 2003 final (\$1,000)	FY 2004 final ² (\$1,000)	Total estimated 2002 full- cycle costs (\$1,000)
Direction	\$4,200	\$3,600	\$4,400	\$4,600	\$5,350	\$22,150
Content determination and design (includes printing)	\$1,100	\$3,900	\$4,650	\$1,820	\$1,810	\$13,280
Mail list development and mailout	\$2,300	\$2,150	\$4,670	\$8,840	\$2,900	\$20,860
Collection and processing	\$6,440	\$4,668	\$10,400	\$22,900	\$8,250	\$52,658
Publication and dissemination	\$2,450	\$700	\$1,230	\$3,114	\$6,969	\$14,463
Total estimated obligations	\$16,490	\$15,018	\$25,350	\$41,274	\$25,279	\$123,411

¹ FY 2000 total includes about \$9.65 million for the 1997 Census of Agriculture and \$1.9 million for the 1999 Agricultural Economics and Land Ownership Survey.

² FY 2004 total includes \$10,000 for 2005 Census of Aquaculture costs.

ORGANIZATION AND STRUCTURE

NASS is a key information agency within the Research, Education, and Economics mission area of the USDA and has collected information on U.S. agriculture since USDA was founded in 1862. Since that time, the responsibilities of NASS have increased and the statistical program and organizational structure have evolved into a headquarters unit consisting of four divisions and 46 Field Offices serving all 50 states and Puerto Rico.

Census activities associated with handling follow-up activities of nonrespondents, editing report forms, and review and analysis of tabulated data fully utilized NASS's existing field organization and State-level knowledge of farm operations.

On October 1, 1999, the beginning of FY 2000, NASS implemented a new headquarters organizational structure. NASS's field organization remained unchanged. The new structure facilitated cross-functional work by emphasizing and strengthening the role of teams. The impact of this organizational change on the 2002 Census of Agriculture was minimized due to the timing of implementation during the last year of the previous census cycle.

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PRELIMINARY PLANNING

Review of 2002 Census Processing

The 2002 Census of Agriculture was conducted by USDA's National Agricultural Statistics Service (NASS). NASS made major changes to the data capture process. The most significant of these changes was the extensive use of report form scanning and Optical Character Recognition (OCR).

Census reports were scanned for image and OCR software translated the handwritten alpha-numeric responses to machine-readable text. OCR reduced keying costs and speed of data capture. However, there were inaccuracies; for example, the software's inability to screen out stray marks. These marks showed up as 1's in the data set and significant staff time was spent removing the 1's from the data set.

The digital report form images were electronically transmitted to the Field Offices for use by staff during the editing and analysis phase. This allowed Field Office staff to view what respondents actually entered onto their forms. Using scanned images gave NASS greater flexibility in processing and eliminated the cost of shipping report forms to the Field Offices.

The changes to the 2002 Census of Agriculture led to significant improvements in overall processing efficiency and data quality. The use of new technology allowed NASS to contain and control census costs. Initial planning for the 2002 Census of Agriculture enumeration included a systematic study of the 1997 processing, tabulation, and disclosure systems. The general processing strategies for the 2002 Census of Agriculture enumeration were developed at a series of weekly meetings. Budgets and staff resources limited what could actually be developed and implemented.

Planning Teams and Committees

In 2000 during the initial planning stages for the 2002 Census of Agriculture, various planning committees and teams were organized to review program and system changes and to develop the new systems and tools.

USE OF TAGGED RECORDS

During the final phase of the census list frame development process, each Field Office reviewed the names and addresses of respondents on the census list frame for their respective State and electronically tagged records that they thought would be better handled by personal enumeration rather than by the traditional mailout/mailback approach. Criteria used to select records for tagging included, but were not necessarily limited to:

- Coordination with other on-going NASS surveys;
- A respondent's desire to be contacted by personal interview;
- Knowledge of other needs for special handling;
- Relative importance of the operation to the State's agriculture.

Each Field Office was responsible for the data collection of tagged records. The method of enumeration (face-to-face enumeration, telephone enumeration, or mailout/mailback from the Field Office) of tagged records was at the discretion of the Field Office. Tagged records were excluded from all census mailout and follow-up operations conducted at NPC. It was imperative that the Field Offices managed the enumeration of these records effectively and tracked their progress. About 30,000 records were tagged. See Appendix C, Table C1 for additional detail.

CHANGES IN COMPUTER HARDWARE

Computer access and security issues were critically important throughout census processing. Unlike the 1997 census, when the primary processing computers used to process the census were controlled by the Bureau of the Census, the computers used to process the 2002 Census of Agriculture were owned and operated by NASS. The only exception was the Bureau of the Census computers at NPC used for Optical Character Recognition (OCR) data capture and transmission of files to NASS. Only sworn NASS employees could gain access to census data. This system was very effective in protecting the confidentiality of the data and allowed timely processing of the census.

In preparation for the census, and as a result of technological advancements, necessary upgrades were made to the computer system's hardware, software, infrastructure, and architecture.

COMPUTER-ASSISTED TELEPHONE INTERVIEWING

Overview

Collecting data using a Computer-Assisted Telephone Interview (CATI) system was the responsibility of NASS's Field Offices. Each Field Office used CATI to interview nonrespondent cases and records tagged for telephone collection and transmitted their data to the main census data file. Cases identified for CATI follow-up included some of the 1997 census nonrespondent records and records in low response counties.

CATI Staff Training

Field Office personnel were responsible for training the CATI enumerator staff for the census follow-up work. Training included an introduction to the census and an overview of the paper report forms and special instructions for the census of agriculture. There was a practice area in the CATI application that enumerators used to familiarize themselves with the various options and to practice different scenarios provided by headquarters personnel. Enumerators were also given reference materials to use during the interviews to help guide them through various procedures. Many enumerators who made CATI data collection calls were familiar with the census form and had prior training with instruments similar to CATI.

CONSULTATION ON THE CENSUS

General Information

NASS's mission is to provide timely, accurate, and useful statistics to the public. Therefore, NASS must determine which statistical information is most needed. Since the data compiled in the statistical tabulations must be supplied by individuals and/or organizations outside the agency, NASS must know whether the respondents to its census of agriculture and surveys will be able to supply the information requested.

In planning for the census of agriculture, NASS sought advice from data users on current and future data needs, the ability of respondents to supply the data, general data collection methods, content and format of report forms, and publicity programs to support the census. NASS maintains regular contact with its advisory committee, Governors and departments of agriculture in all 50 states, land-grant (agricultural) universities, Federal departments and agencies, and other data users and suppliers via an extensive outreach program and welcomes their advice and suggestions.

Advisory Committee on Agriculture Statistics

The Advisory Committee on Agriculture Statistics drew on the experience and expertise of its members to form a collective judgment concerning agriculture data needs and the statistics issued by NASS. This input was vital to keeping current with shifting data needs in the rapidly changing agricultural environment and keeping NASS informed of emerging developments and issues in the agriculture community that could affect agriculture statistics activities.

The Committee, appointed by the Secretary, consists of 25 members who represent a broad range of interests, including agricultural economists, rural sociologists, farm policy analysts, educators, State agriculture representatives, agriculture-related business and marketing experts, and members of major national farm organizations. In addition, a representative of the Bureau of the Census, U.S. Department of Commerce, and a representative of the Economic Research Service, USDA serve as ex-officio members of the Committee.

Governors, State Departments of Agriculture, and Land-Grant Universities

Agriculture is the most important industry in a number of States and is a significant industry in all 50 States, as well as in Puerto Rico and the outlying areas. NASS routinely asks State governments for assistance in publicizing the census. Both the Governors and the State departments of agriculture have a considerable interest in the content of the census report forms and in the completeness and accuracy of the enumeration. NASS mailed letters to the State Governors and departments of agriculture, as well as to their land-grant universities, asking for their requests and recommendations on data content for the 2002 census. The responses were considered in the design of the census form.

Federal Departments and Agencies

Numerous Federal departments and agencies use census of agriculture data. Consequently, appropriate Federal departments and agencies, including all U.S. Department of Agriculture agencies, were contacted and asked to define their data needs, provide a justification for why data were needed at the county level, and make suggestions for change.

Content Selection Criteria

As a part of the preparation process for each census of agriculture, each potential data item on the report form was evaluated. For the 2002 Census of Agriculture, each department, agency, group, and organization was asked to identify and justify relevant data needs and indicate if the data item was:

- Directly mandated by Congress or if the item had strong Congressional support;
- To be used in proposed or pending legislation;
- Needed for evaluation of existing Federal programs;
- Essential, such that if omitted from the census of agriculture, would result in additional respondent burden and cost for a new survey for other agencies or users;
- Required for classification of farms by historical groupings;
- Needed to provide information on current problems.

CONTENT TEST

Overview

Prior to most agriculture censuses, the census staff engaged in detailed studies and planning aimed at obtaining the most complete and efficient enumeration. Typically, this planning process included one or more field tests of materials and/or data-collection methodologies, and provided an opportunity to evaluate suggested changes in data content, forms design, changes in instructions to respondents, and other factors that might affect the accuracy and completeness of the enumeration. In preparation for the 2002 Census of Agriculture, a content test was conducted that focused on several major proposed changes. These changes involved not only report form design and content, but also the data capture method and changes associated with data editing and processing procedures. Specific changes for evaluation included:

- The collection of new data including information about multiple operators, production contracts, and migrant workers;
- Changes to the wording of the existing items to achieve consistency with other NASS surveys;
- Changes to the formatting of some sections including the demographic section, the value of sales items, and changes to the order of some questions and sections;
- The use of Optical Character Recognition (OCR).

Methodology

Phase 1, Pretesting – The first phase of the content test began in May 2000 with an evaluation of preliminary drafts of 2002 report forms by field enumerators at the Maryland and Virginia Field Offices. These preliminary drafts contained changes suggested by NASS subject matter experts, NASS Field Office staff, and outside organizations such as State departments of agriculture, land-grant universities and colleges, national farm organizations, and other Federal agencies that make extensive use of agricultural census data.

Pretesting of the content test report form, which included suggestions and comments from preliminary draft reviews, was conducted with farmers and ranchers during the summer of 2000 in 15 states. Approximately 120 cognitive interviews were conducted and included all kinds of farming operations, including specialty farms such as aquaculture and emu operations. Respondents were asked to complete the report form as if they had just received it by mail. After they had completed the report form, they were asked specific questions about the report form, e.g. what sections or questions were confusing to them and which data items they thought would be hard to obtain. The results from this phase were used to further refine the new questions and develop three different versions of the census report form. As a result, three different 2000 Census of Agriculture Content Test report form versions – referred to as panels – were developed for nationwide testing in Phase 2.

Phase 2, Testing of Proposed Report Forms – The second phase consisted of a national mailout of three final 2000 Content Test report form versions simulating the procedures planned for use in the 2002 Census of Agriculture. A sample of about 15,000 cases were equally distributed among three panels (5,000 cases per panel). Each panel consisted of two types of forms – a sample (long) and a non-sample (short) form. Within each panel the sample and non-sample forms were the same, except the sample form included additional sections or questions on production expenses, fertilizers and chemicals, machinery and equipment, market value of land and buildings, and farm labor. Half the sample addresses in each panel received the sample form and the other half received the nonsample form.

Between panels, the order of some of the sections and/or items was changed, and sometimes the wording and/or format of the questions also varied. A toll-free telephone help line was operational during the census content test and all report forms had this telephone number printed on the front and back pages. The Content Test

Incoming Telephone Call (CITC) system was used during Phase 2 of the content test to track questions and handle complaints made by respondents to the help line. The CITC system was designed to store particular information about the reason for calling and the final outcome of the calls. This information was used to determine which sections and questions seemed to be more problematic to the respondent. In addition, response rates for each of the three panels were used to measure the impact of changes to the report form. However, unlike the census, the content test was not mandatory, therefore direct comparison could not be made between the overall content test response rate and the expected response rate for the 2002 census.

After completion of the data collection period, all records were run through a simple edit computer program. The edit program indicated missing data, inconsistent relationships between reported data, extreme data values and erroneous data. This edit program was used as an indicator of data quality. It provided some information about the number of records that failed a particular edit.

Phase 3, Follow-up Interviews – The third phase of the content test consisted of follow-up interviews of a subsample of the phase 2 mailout. Many of these records were chosen because of their unique type of agricultural production or because they appeared to have particular reporting difficulties. A total of 3,471 operations were preselected for possible follow-up. Of these, 1,075 completed a report form in Phase 2 and were eligible for Phase 3 follow-up interview. A total of 657 Phase 3 follow-up interviews were completed. Personal interviews were conducted during this phase to measure response accuracy by asking respondents specific questions about their completed report form. The goal was to find out if respondents understood what was being asked and if they answered the questions correctly. This phase was particularly important because it provided quantitative information that enabled NASS staff to evaluate the difficulties encountered while answering specific questions on the report form.

Chapter 3. Preparatory Operations

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GENERAL INFORMATION

Preparatory operations for the 2002 Census of Agriculture began during FY 2000 and consisted of five major activities:

- Preparation of report form supporting instructions;
- Preparation of the census mail list (CML);
- Sample selection for the sample report form;
- Printing and preparation of report forms for mailing and of related enumeration materials;
- Formulation of a promotional program to encourage cooperation by agricultural operators.

REPORT FORM SUPPORTING INSTRUCTIONS

Once report form content was finalized (See Chapter 2, section on “Consultation on the Census” and “Content Test” for details), the various supporting documents were prepared. These documents included information sheets, letters, special inserts, a code book, and editing guide. Table 3-3 provides descriptions and quantities of these commercially printed materials.

CENSUS MAIL LIST PREPARATIONS

Overview

A mailout/mailback data collection method has been used to collect census information since the 1969 Census of Agriculture. The self-enumeration procedure reduces costs compared to a personal-interview methodology, but requires a complete and accurate name and address list for operations meeting the census farm definition. To further reduce costs and respondent burden, it is also essential to eliminate as many duplicate and nonfarm records from the list as possible. This is accomplished during the list building process. Respondent burden is also reduced by asking all respondents a set of core questions and only a sample of respondents additional questions about the economic characteristics of their operations. The final 2002 census mail list contained approximately 2.84 million names and addresses.

Merging the NASS List Sampling Frame and the 1997 Census Mail List

In 1997 the responsibility for conducting the census of agriculture was transferred from the Census Bureau to the National Agricultural Statistics Service (NASS). Following the completion of the 1997 census, the census mail list was merged with the NASS List Frame. Merging the two lists improved the efficiency of list building and maintenance in the future. Census data were used to update control data and demographic items on existing NASS list records. The merge of the two lists improved the coverage levels of the NASS List Sampling Frame and the quality of the records on the frame.

In 1998 (prior to merging the two lists), the NASS list frame consisted of 1.4 million active records. An active record is a record believed to meet the NASS farm definition of an operation that produced and sold, or normally would have produced and sold, \$1,000 or greater of agricultural products. Data associated with these records accounted for 876.5 million acres of land in farms.

Of the 3.1 million records mailed and delivered in 1997, 1.7 million records (unweighted count) reported data sufficient to meet the farm definition (in-scope records). Nearly 1 million records did not meet the farm definition (out-of-scope), based on 1997 census reported data. Finally, the mail list also contained 400,000 records that did not respond.

The NASS list frame and Census mail list were merged over a series of four different phases. NASS and Census records were linked together using probabilistic record linkage methodologies executed by Headquarters staff. The matches were executed on a state-by-state basis. The output from the record linkage process was reviewed by staff in each NASS Field Office. Having the review performed in the Field Offices was advantageous because of the vast knowledge Field Office personnel have with the farm operations in their particular state. Field Office personnel had resources to contact operations when questions arose about the status of an operation. The insight and background of the Field Office staffs helped produce an end list with the highest coverage and least amount of duplication possible.

The four phases of merging the two lists were divided based on the different categories of Census records. Records were either added to or dropped from the NASS frame based on Census information. A farm status code is associated with each record on the NASS list sampling frame. This status indicates whether a record is a known farm, an operation that does not meet the criteria to be a farm, or a potential farm whose status is unknown.

Phase 1 – The first phase involved merging the 1.7 million Census records that were known to be farms with the NASS list sampling frame. This phase was conducted between September 1998 and December 1998. The merge resulted in approximately 540,000 new records with a known farm status being added to the NASS list sampling frame. There were 45,000 NASS records thought not to meet the NASS farm definition that matched 1997 Census in-scope records. The status of these records was updated on the NASS list sampling frame to indicate the records met the farm criteria. Finally, the first phase of merging the two frames resulted in 12.7 million agricultural data items being updated on the NASS list sampling frame.

Phase 2 – The second phase of merging the two lists involved merging the 800,000 Census records that did not meet the farm definition with the NASS list sampling frame. This phase took place between April and June 1999. This merge resulted in a change of the status of approximately 160,000 NASS list sampling frame records from known active farm records to a status code indicating that the records did not meet the farm definition. Records that are known not to meet the NASS farm definition are generally maintained on the NASS list sampling frame for five years. Phase 2 of the merge also resulted in 470,000 new non-farm records being added to the NASS list sampling frame.

Phase 3 – The third phase of merging the two frames involved merging approximately 525,000 potential farm records to the NASS list sampling frame. The majority of these records were non-response records from the 1997 Census of Agriculture. Phase 3 was conducted between August 1999 and December 1999. A small portion of the records were potential farm records on administrative source lists received by the Census Bureau after the 1997 Census. This phase resulted in approximately 200,000 potential farm operations being added to the NASS list sampling frame.

Phase 4 – The fourth and final phase of merging the two lists involved matching the NASS list sampling frame to 50,000 1997 census records that were returned by the post office as undeliverable as addressed. It was conducted during the spring of 2001. Cases where the NASS list sampling frame record had the same address as the census of agriculture record were researched to find new addresses.

After all four phases of merging the NASS and Census lists were complete in 2001, the NASS list sampling frame consisted of 1.84 million active records covering 949.5 million acres of farmland. The merge resulted in

an increase of about 440,000 records covering 949.5 million acres of farmland. The majority of the new records added occurred in small farms and specialty commodities.

Sources

NASS normally builds and maintains its list sampling frame by using data from administrative lists. However, the work of merging the Census and NASS lists between 1998 and 2001 prohibited large-scale use of administrative lists during this time-period. From 2000 to 2002 focus returned to obtaining and using administrative lists to improve coverage levels. Analysis of the NASS list sampling frame was done to determine areas where coverage was the weakest. The analysis showed that coverage of CRP only farms, specialty livestock farms, and equine farms were weakest. Special effort was put into obtaining specific lists targeting these weaker areas.

The Field Offices put a great deal of effort into obtaining outside source lists to improve their frames. Depending on the size and medium of the lists, they were either reviewed manually or using probabilistic record linkage. Sources of the lists included state farm census lists, breeding association lists, livestock or crop association lists, farm bureau lists, seed grower lists, pesticide applicator lists, veterinary lists, marketing association lists, and a variety of other agriculture-related list sources.

A total of 86 different outside source lists were run through the record linkage process. There was a total of 1,676,048 incoming records on the lists. These lists resulted in 361,226 new potential farms being added to the NASS List Sampling Frame. The status of 13,625 existing records was changed to indicate that the records were potential farms rather than non-farms.

In addition to the State specific outside source lists, a few national lists were processed under the direction of Headquarters. These lists included a few livestock and commodity lists. They also included a list obtained from the Farm Services Agency (FSA) of records receiving Conservation Reserve Payments (CRP) for 2002. The FSA list contained approximately 310,000 records. After matching these records to the NASS list sampling frame, about 88,000 new records were added. The status of an additional 37,500 records was changed from non-farms to a status indicating that the records had CRP land. Past censuses have shown that operations with CRP land often do not complete the census report form correctly. Adjustments were made to the report form wording to minimize these problems for the 2002 Census. Records with CRP land were given a special status code and special care was taken during the Census to ensure that their reports were correct.

As part of NASS's responsibility to conduct the census of agriculture, NASS received access to select agricultural Internal Revenue Service (IRS) records for Census use. These records were used to help improve the NASS list sampling frame. However, to ensure the strict security requirements of the IRS data, no IRS data were ever commingled with the NASS List Sampling Frame. The IRS data processing was all done within a limited-access secure area. No IRS data ever left that area. The processing with the IRS records was done over the period of spring 2001 to summer 2002.

NASS used these records for two purposes. First, the IRS records were used to identify existing list frame records that were probable farms, but whose status at the time indicated that they did not farm. The status of these records was changed to indicate this potential and the operations were contacted to determine their true operating status. The status of approximately 270,000 records was changed as a result of these efforts. Second, the IRS records were used to identify operations on outside source lists that were probable farms. The probable farms from the outside sources were then matched against the NASS list frame. If they were not found on the frame as active or potential farms, the outside source name and address were added to the potential farm group. Approximately 550,000 new outside source list names and addresses were added from this matching.

Over the course of a year, Field Offices attempt to contact as many records as possible that are marked on the NASS list frame as potential farms to determine whether or not they actually are farms. This typically is done by mailing a report form or making a phone call. If the operation is involved in agriculture, general agricultural data are collected. The number of records that are contacted in a given year is based on available time and resources.

Farm Identification Survey

During 2002, contact of potential farms was directed at the Headquarters level through the Farm Identification Survey (FIS). The FIS form was designed to screen out respondents that did not have any agricultural acreage, production, Federal farm program payments, or the potential for future agricultural sales. There were two FIS samples.

Beginning in April 2002, NASS conducted the 2002 Farm Identification Survey to screen approximately 591,000 potential farms before placing them on the CML. These records were mailed a one-page report form mid-April and a nonresponse followup mailing was made in May 2002. A second mailing to a group of approximately 569,000 additional potential farm records was conducted in mid-July 2002. The second sample did not have a follow-up mailing for non-response. Of the 569,000 records, approximately 117,000 were out of scope (O/S) with no future sales indication.

The entire screener phase confirmed about 350,000 qualifying farms that were added to the CML. Approximately 283,000 names were confirmed as out of scope (O/S) and were dropped from the list.

Names returned as Undeliverable-As-Addressed (UAA) totaled just over 92,000 and were excluded from further census mailings. The remaining approximately 435,000 names did not respond and were mailed census forms although they were not added to the CML as active farms.

Table 3-1. 2003 Farm Identification Survey Receipts

Distribution status of mailed records	Approximate number of records (1,000)
In-scope (meets census farm definition)	350
Out-of-scope (does not meet census farm definition)	283
Non-response	404
Undeliverable As Addressed (UAA)	123
Total	1,160

Record Unduplication and Address Quality

During the spring and summer of 2002, NASS prepared the records that would ultimately be included in the 2002 Census Mail List (CML). The Field Offices improved name and address quality and removed duplication both within their state and across the U.S. They identified records with special operating arrangements that needed special treatment either during the Census data collection or during the Census analysis.

Because of the process of building and maintaining the NASS List Sampling Frame (LSF), duplication was introduced onto the frame. To minimize the duplication, each Field Office's list sampling frame was unduplicated using probabilistic record linkage techniques. This process brought records with the same Social Security Number (SSN), Employee Identification Number (EIN), and phone number together for Field Office

personnel to review. In addition to these records, records with similar names and addresses were brought together for review. The processing and review were done just before the Census Mail List (CML) was compiled in the summer of 2002.

In addition to removing duplication within each state, an attempt was also made to identify duplication across states. A procedure was run that identified records with the same SSN, EIN, or phone number across states. These potential duplicates were also reviewed by Field Office personnel.

NASS undertook another effort to ensure that addresses for its records were as complete and accurate as possible. In February 2002, NASS contracted with Lorton Data Inc. to provide data conversion and mail list processing services. This service included processing the entire NASS list frame through the National Change of Address (NCOA) and Locatable Address Conversion System (LACS). Field Office personnel reviewed the output of this work for accuracy.

A number of records on the NASS list frame had missing or invalid phone numbers. These records were matched against a nationally available phone database to obtain as many phone numbers as possible. This match process also was done just before the mail list was pulled in the summer of 2002.

Headquarters personnel created a number of reports that Field Offices could review to identify and correct potential problems prior to the pull of the final 2002 census mail list. These reports generated errors that were either classified as critical or warning errors. The critical error reports included the following types of records:

- Records with multiple people associated with the same operation (only one person should report data for the same operation);
- Records with no person name or operation name;
- Records with a city or ZIP code that was not a valid US Postal Service place/zip combination;
- American Indian Reservation records that were not tagged;
- Records that did not have a county;

The warning error reports included the following types of records:

- Records with a city, state, and ZIP Code, but no address;
- Records with a person name that contained two or more contiguous numbers;
- Records with an operation name that contained two or more contiguous numbers;
- Records with a foreign address;
- Records that were tagged or Institutional, research, experimental, and American Indian reservation farms, but did not meet the criteria for the final 2002 Census Mail List;
- Records with agricultural data indicating that the record may have been agri-business that was on the final 2002 Census Mail List;

The final mail list was pulled on September 1, 2002. When the list was pulled, there were 2.84 million records. These records can be broken down into 1.8 million records that were thought to meet the NASS farm definition and about 1 million potential farm records.

Table 3-2. Census Mail List, 2002 Census of Agriculture

Breakdown by mail list status	Number of records (1,000)
Active farm records	1,843
Farms or ranches with total value of sales less than \$1,000	66
Potential farm records	652
Farms previously inactive	147
CRP only	136
Total	2,844

Record linkage was used to create, update, and unduplicate lists. It was used to identify two or more records that could correspond to a single entity. Generally, the records came from large lists, which made manual matching impractical. Computer algorithms were developed which automated the matching process. Records were grouped together, or matched, based on the likelihood that they represented the same individual.

Before a file could be optimally linked, its name and address fields had to be standardized. In most lists, names and addresses were recorded in a free format. Nicknames and other abbreviations were often given rather than proper names. Standardization transformed inputted data from a variety of name and address formats into a standard fixed format. By partitioning the data fields into consistent representative pieces, the matching algorithms were more effective in distinguishing between potential matches.

After standardization, a list was ready to be matched. The number of potential matches when two files were compared against each other was very large. Lists were broken down into mutually exclusive partitions called blocks that made the task of comparing the records more manageable. Only records within the same block were examined for possible matches. Records in different blocks were considered nonmatches. Multiple passes with different blocking variables was used to minimize the effect of reporting errors.

As records were processed by the computer, they were classified into three distinct groups: nonmatches, matches, and possible matches. Nonmatches were the records on the list that appeared to be unique. Matches were two or more records that all seemed to represent the same entity. Possible matches were records that were too close for the computer to decide. They required human intervention. Ideally, the number of possible matches is small.

The computer assigned record pairs as matches, nonmatches, or possible matches based on a composite weight which was calculated for each pair. This weight was a measure of the likelihood that the record pair represented a common entity. It was calculated by comparing a set of components for each record pair. Each component comparison was given either a positive or negative score, depending on whether it was a match. The individual component scores were then summed to obtain a composite weight. This composite weight was compared against two thresholds or cutoffs which classified the pair as a match, possible match, or nonmatch.

SELECTION OF RECORDS TO RECEIVE SAMPLE REPORT FORMS

Background

Large-scale sampling was introduced for agriculture data collection in the 1945 Census of Agriculture. Post-census sample surveys were used to supplement the basic data collected in the 1959 and 1964 Censuses of Agriculture. In the 1978 and following censuses, the census list was sampled to collect specified additional data from selected agricultural operations. All farms were asked for basic data, while a sample of approximately 25 percent of the addresses on the census list received a sample report form requesting additional information. The additional questions on the sample report form included items such as usage of fertilizers and chemicals, farm production expenditures, value of machinery and equipment, value of land and buildings, hired workers, etc.

Sample Selection Rates

The sample form was mailed to all mail list records in Alaska and Rhode Island and to a sample of records in other States. Mail list records were selected into the sample with certainty if they (1) were expected to have a large total value of agricultural products sold or large acreage, (2) were in a county with less than 100 farms in 1997, or (3) had other special characteristics (e.g. institutional farms, experimental and research farms, American Indian reservations, etc.). Mail list records in counties (including parishes) containing:

- 100 to 199 farms in 1997 were systematically sampled at a rate of 1 in 2;
- 200 to 299 farms in 1997 were systematically sampled at a rate of 1 in 4;
- 300 to 399 farms in 1997 were systematically sampled at a rate of 1 in 6;
- 400 or more farms in 1997 were systematically sampled at a rate of 1 in 8.

The mail list records not chosen to receive the sample form received the nonsample census form. This differential sampling scheme was used to provide reliable data for the sample sections of the report form for all counties. The regional report form versions and the sampling scheme were used to provide reliable data for a large number of items/commodities at the county level, while reducing response burden.

Must Records – Must records were mostly composed of those agriculture operations that were so large that failure to include their data might distort the census statistics. A response was needed for every must case; secondary sourcing was required for any nonresponse. These operations all received a sample census report form and underwent extra enumeration efforts to ensure census accuracy. For the most part, records were included based on previous and administrative total sales, i.e. Total Value of Product sold (TVP), and acreage data. Also, all records in Rhode Island and Alaska were deemed to be must records.

Tagged Records – Tagged records were agricultural operations that individual Field Offices felt were important to agriculture in their state. These operations were not necessarily large; in many cases, the tagged records were farms that made a significant contribution to the production of a specific commodity but were small in size relative to other types of operations. All tagged records received the sample report form. Additionally, all records known to be in NASS's Agricultural Resource Management Survey (ARMS) were also tagged by headquarters. Many of the questions on the ARMS survey overlapped census questions, so data collection was coordinated to minimize respondent burden.

PRINTING AND LABELING REPORT FORMS

Printing of Report Forms and Supporting Materials

NASS contracted through the U.S. Census Bureau's National Processing Center (NPC) in Jeffersonville, IN, with commercial printers to print report forms, letters, information sheets, mailout and return envelopes, and other enumeration materials. Contractors printed the various forms and assembled mailout packets for the initial and follow-up mailings using written specifications provided by NASS and NPC. Quality control was conducted at the printing plants by NPC, NASS, and Government Printing Office (GPO) quality control personnel. Completed packets were shipped to the NPC warehouse in Jeffersonville, IN for ink-jetting mailing labels, postal order sort and mailout. Quantities of commercially printed report forms and supporting materials are provided in Table 3-3. Mailout materials for Alaska were not printed on contract. Rather, Alaska report forms and related materials were printed in-house.

Table 3-3. **Quantities of Commercially Printed Mailout Materials (excludes Alaska)**

Designation	Description	Quantity
Information Sheets and Form Letters:		
02-A01(I), A02(I), and A03(I)	Instruction sheets - nonsample, sample, and Hawaii only	6,356,000
02-A01(L1) and (L1A)	Initial and Undeliverable as Addressed (UAA) mailout letters	3,246,700
02-A01(L3), 02-A01(L3) MU, 02-A01(L4), 02-A01(L4) MU	Follow-up letters, including special multi-unit letters ¹	3,034,300
02-A01(F)	MU flyer	28,300
Envelopes:		
02-A7.1, (P), and (MU); 02-A7.2, 02-A7.2/3(P) and (MU); 02-A7.3; 02-A7(UAA), P, and MU; 02-A7(GR), P, and MU; 02-A7(BL), P, and MU	Outgoing envelopes, including partners, multi-units, UAAs, general request, and blanks	6,444,100
02-A8A, (N), (S), and (BL)	Return envelopes - Nonsample, sample, blanks,	6,395,000
Report Forms:		
02-A0101 through A0112, and A0114	Nonsample report forms	5,085,700
02-A0201 through A0212, and A0214	Sample report forms	1,457,400

¹ Letters printed in-house by NASS and stocked at NPC.

Mailing Packets Preparation

Mailing packet contents for the initial mailout in December 2002 are shown in Table 3-4.

Table 3-4. **Summary of Mailing Packages for the Initial Mailout**

Type	Report form	Information sheet	Outgoing envelope	Return envelope	Cover letter
Nonsample	02-A0101 thru 02-A0112	02-A01(I) 02-A03(I) ¹	02-A7.1	02-A8(N)	02-A01(L1)
Multi-units	02-A0101 thru 02-A0112	02-A01(I) 02-A03(I)	02-A7.1(MU)	02-A8(N)	02-A01(L1)
Partners	02-A0101 thru 02-A0112	02-A01(I) 02-A01(I) ¹	02-A7.1(P)	02-A8(N)	02-A01(L1)
Sample	02-A0201 thru 02-A0213	02-A02(I), 02-A02(I)AK ² 02-A03(I) ¹	02-A7.1 02-A7.1(AK) ²	02-A8(S) 02-A8(AK) ²	02-A01(L1) 02-A01(L1)AK ²
Multi-units	02-A0201 thru 02-A0212	02-A02(I)	02-A7.1(MU)	02-A8(S)	02-A01(L1)
Partners	02-A0201 thru 02-A0212	02-A02(I)	02-A7.1(P)	02-A8(N) 02-A8(S)	02-A01(L1)

¹ Hawaii only

² Alaska only

Quality Control

Private contractors printed and assembled the 2002 Census of Agriculture mailing packets to specifications supplied by NASS and NPC. NASS staff along with teams of two or three NPC quality control (QC) personnel made on-site inspections at each contractor's printing facility when the forms and packets were being printed and assembled. Report forms and envelopes were subject to a visual and QA equipment review to make certain the printing was of acceptable quality using the ink density level stated in the contracts. Random samples of individual package types were opened and examined to ensure that correct materials had been used.

Each contractor boxed and shipped a sample of each day's production of assembled packets for QC review at NPC. NPC's QC staff specified that a day's QC sample size was determined by the total number of boxes of packets produced by that day's printing run. The QC staff then pulled three packets at random from each box for inspection. When an error was identified, the remainder of the packets in the box involved were checked as well. If similar or other errors were found, the packets from surrounding boxes also were inspected. Examples of errors discovered were: 1) missing staples, 2) volume shortages, 3) torn envelopes, and 4) defective adhesives. All detected errors had to be corrected before the packets were accepted and stored in the NPC warehouse prior to labeling and mailing.

Labeling

The 2002 Census of Agriculture mail list comprised about 2.84 million names and addresses. NASS created a computerized mailing list, then electronically transmitted the list to NPC.

The NPC staff used the address list files to ink-jet the labels directly onto the report forms using high-speed printers. Mail labels for all mailings were printed by form number in ZIP Code sequence. As labels were printed for the initial and both follow-up mailings, NPC Quality Control (QC) clerks monitored the printing to ensure that the address and bar codes were properly formatted, legible, and that the bar codes were visible through the envelope window. QC clerks checked the initial set of labels from each file for each form type from each printer. Quality control problems with any file resulted in partial or complete reprinting, as needed.

Labeling equipment at the NPC facility ink-jetted the labels through the open windows of the outgoing envelopes. The equipment labeled mailing packets at the rate of up to 10,000 per hour. QC staff inspected the labeling machines prior to each production run and checked at random intervals during each run to ensure that the labels were printed on the correct forms. Packets that were incorrectly or illegibly labeled were removed and replaced with valid packets.

The labeling for the initial mailout began in late September 2002 and was completed by the end of November 2002. NASS released the mailing packets to the U.S. Postal Service for mailing on December 12, 2002. The initial mailing from the NPC was completed on December 16, 2002.

PUBLIC AWARENESS PROGRAM

In addition to the usual preparatory operations – report form design, list frame development, printing and addressing report forms, etc. – a public awareness program was implemented to promote the census of agriculture and encourage farmers and ranchers to respond to NASS's request for the information. Chapter 4 provides a description of the 2002 Census of Agriculture Public Awareness Program.

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INTRODUCTION

The 2002 Census of Agriculture is the second census conducted by the USDA's National Agricultural Statistics Service (NASS). Prior to the 1997 census, the public awareness program was a centralized effort controlled and implemented by the Agriculture and Financial Statistics Division at the Census Bureau who conducted and managed the previous censuses of agriculture. With the shifting of responsibility for the census of agriculture from the Census Bureau to NASS in February 1997, the public awareness program also shifted into more of a decentralized effort that was planned and managed at the national level by NASS headquarters in Washington, D.C. but implemented at the local level through NASS's 45 Field Offices.

GENERAL INFORMATION

Objectives

The public awareness program for the 2002 Census of Agriculture had two major parts—data collection and data release. The data collection outreach phase was primarily designed to persuade farm and ranch operators to complete and return their census report forms. The program's objectives were to:

- Encourage farmers and ranchers to respond to the agriculture census by February 3, 2003;
- Create public awareness of the agriculture census;
- Inform farmers and ranchers of the benefits of the census data to their own operations;
- Emphasize the confidentiality of the census data;
- Defuse negative attitudes toward the census.

The data release, or post-census, phase of the awareness program was intended to:

- Increase public awareness of the agriculture census and its data products;
- Increase public access to, and use of, agriculture census data products.

Census Marketing Board

NASS established a Census Marketing Board comprised of four members of the Marketing and Information Services Office (MISO) at headquarters, one staff member from Questionnaire Design Section at headquarters, one staff member from Statistics Division at headquarters, five Field Office Directors (representing ND, AR, NV, CO, and NJ) and 2 Field Enumerators from VA and KY. Board members contributed to the development of public awareness plans and materials. Field office representation was invaluable to the success of the public awareness program due to their unique experience and knowledge of both the target audiences (i.e., farmers and ranchers) and field office operations.

Headquarters and Field Office staffs informed various other USDA agencies of the census plans prior to mailout and requested their assistance in promoting the importance of the census through their channels.

Strategies and Activities

Prior to 1997, all of the promotion and marketing activities were directed by a centralized headquarters unit, but public awareness activities for the 1997 and 2002 censuses were primarily decentralized. Program activities were coordinated through national contacts by headquarters staff and handled locally through the Field Offices. Headquarters provided templates and materials to Field Office staffs who then heavily promoted the census to their state and local farm associations, media, legislatures, etc. in a very grass roots effort. At the headquarters level, contacts were made to national media (e.g., farm broadcasters, agricultural editors and publishers), national farm organizations, and other national-level partners.

Headquarters staff hosted exhibits at national agricultural and agribusiness expositions and conventions including the American Farm Bureau Federation, National Cattlemen's Beef Association, National Agri-Marketing Association, National Association of Farm Broadcasters, American Agricultural Editors Association, and other commodity, media, and trade association meetings. Field Office staff attended hundreds of state and local meetings of these same types of organizations. At these meetings, NASS staff formed new and built upon existing working relationships to promote the census and its benefits. Many Field Office staff gave presentations at these meetings to promote the reasons to respond to the census and, after census results were compiled, to announce the results of the census.

Before the census mailout in December 2002, promotional activities concentrated on raising general awareness of the census and encouraging early and complete response. After the bulk of the data had been collected, the focus of the program shifted to informing the public, and particularly potential data users, about census product data content, format, media, and availability.

Slogan and Logo

The slogan for the 2002 Census of Agriculture showed a consistent message admonishing readers to "Make It Known – Agriculture Counts." The NASS logo was used for the 2002 Census of Agriculture. It depicted a farm barn and silo to the right, a statistical chart to the left, and a green field at the bottom. This image was used on all mailout materials and posters, information kits, press releases and other communication materials, video tapes, drop-in ads provided to magazines and newspapers, and other marketing materials.

CENSUS DATA COLLECTION PUBLICITY CAMPAIGN

Broadcast Materials

NASS headquarters staff, through the direction of the USDA's Office of Communications, developed a variety of broadcast materials for use on both television and radio. The broadcast materials, which included audio and video Public Service Announcements (PSAs) and Video News Releases (VNRs), were as follows:

- "Every Vote Counts," a 30 second PSA featuring Secretary of Agriculture Ann M. Veneman urging farmers and ranchers to complete their census report forms. This PSA was available as an audio PSA on CD and a video PSA on VHS.
- "Time is Running Out," a 30 second PSA featuring Secretary of Agriculture Ann M. Veneman reminding farmers and ranchers to complete their census report forms. This PSA was available as an audio PSA on CD and a video PSA on VHS.
- "Agriculture Census is Underway," a 1 minute and 53 second VNR featuring USDA reporter Pat O'Leary and USDA-NASS Administrator Ron Bosecker. Testimonials were also included from the following

agricultural industry representatives: Crop Life America representative Jack Mitenbuler, Florida A&M University representative Bobby R. Phills, and North Carolina State University representative Ron Wimberley. This VNR highlighted the census as an opportunity for farmers and ranchers to be counted and

- to contribute to the entire agricultural industry by providing vital information. This VNR was available on VHS and as an audio only version on CD.
- “Agriculture Census Nears Completion,” a 1 minute and 38 second VNR featuring USDA reporter Pat O’Leary and USDA-NASS Administrator Ron Bosecker. Testimonials were also included from the following agricultural industry representatives: North Carolina State University representative Ron Wimberley and Vermont Farmers Association representative Jackie Folsom. This VNR reminded farmers and ranchers to complete and return their census report forms and highlighted the importance of the data collected. This VNR was available on VHS and as an audio only version on CD.

Several avenues were used to disseminate the PSAs and VNRs. NASS representatives from both headquarters and state Field Offices visited local radio and television media outlets, Farm Bureaus, commodity and agricultural associations, universities, and other data users to hand deliver information kits on the 2002 Census of Agriculture. Included in the information kits were details on the broadcast materials available and instructions on how to access or request the materials.

For added convenience the PSAs, both audio and video, were available on the NASS Web site. Contact information was provided if individuals wanted to request more information about the broadcast materials or arrange for an interview with a NASS spokesperson. Media outlets were asked to air the broadcast materials from January through April of 2002 to assist in publicizing and promoting the census of agriculture.

In addition, the USDA’s Office of Communications disseminated a media alert to various farm media to notify them of the availability of the census broadcast materials and to ask for their help by providing air time for the PSAs and VNRs. The USDA’s Office of Communications-Broadcast Media and Technology Center also assisted in disseminating the materials by releasing both the radio and video PSAs and VNRs via their weekly television satellite feeds and daily radio news line.

Finally, Southeast AgNet, an agricultural radio network based in Florida, was hired to produce and air short programs, stories, and announcements about the census of agriculture. These features aired frequently on radio stations in Alabama, Georgia, and Florida.

NASS headquarters staff, through the direction of the USDA’s Office of Communications, developed several video and audio public service announcements with the Secretary of Agriculture and the NASS Administrator, providing background information and responses to questions about the census.

NASS headquarters staff also prepared several actualities, providing responses to questions about the census. Farm broadcasters were able to use their own voices as the interviewer for their local audiences.

A separate contractor was hired to duplicate and distribute these public service announcements to rural radio stations and networks across the country. Several Field Offices personally distributed additional copies of the public service announcements to their local radio networks/stations. The USDA radio and television reporters distributed audio and video news releases about the census over their satellite networks.

Printed Materials

While broadcast and other electronic media are increasingly influential in reaching the public, printed materials – newspapers, magazines, posters, informational brochures, bookmarks, etc. – remain an important channel for census promotion. The 2002 public awareness program continued to make use of these materials providing posters and brochures to offices and agriculture-related organizations all over the country for display and distribution; providing articles, press releases, and drop-in advertisements to magazines and newspapers; and preparing slide show presentations, agriculture census guides, and lesson plans.

Headquarters staff prepared templates for the 2002 Census outreach core materials and time lines of target implementation dates and made them available electronically to the Field Offices on the MISO PRIME Center. Finished products were offered and shipped per individual Field Office requests. Electronically available and finished printed products included:

- Census Informational Flyers
- Talking Points
- Frequently Asked Questions
- A Series of Posters
- Promotional Recipient Cover Letter (for those receiving a Partners Tool Kit to help promote the census)
- Report Form Guide
- Magazine Editorial and Feature Stories (both with and without graphs)
- Editor/Publisher Letter to Encourage Use of the Drop-In Ads
- Guide and Fact Sheet for Drop-In Ads
- Drop-In Ads of various sizes, provided in various formats for newspapers and magazines proclaiming:
 - Take a Stand for American Agriculture
 - The Census is Coming to a Mailbox Near You
 - The Census of Agriculture is Coming
 - Does Your Farm or Ranch Count?
 - The Census is Counting on You
- Telephone Contacts List
- Data Release Dates
- Proclamation, Cover Letter, and Sample Press Release (for proclamations by the highest elected officials in each state)

- Press Release Series, including:

2002 Census of Agriculture Begins to Count the Nation's Farms

Nation's 26th Census of Agriculture Begins This Week

Why is the Census of Agriculture Important to You?

Nation's 2002 Census of Agriculture Report Forms Due February 3

Farmers and Ranchers Reminded to Participate in the Nation's 26th Census of Agriculture

Are You in Agriculture? Make Sure Your Farm is Counted

- Slide Show Presentations
- Specialized lists (ethnic radio stations, farm broadcasters, weekly papers, etc.)

The posters highlighted mottos with statements, "Farmers and Ranchers fill out and return your 2002 Census of Agriculture report form as soon as you receive it " and others with the words "We Support the 2002 Census of Agriculture" prominently displayed with graphics. These posters were primarily distributed by the Field Offices in their information kits. The information kits included items such as brochures, bookmarks, talking points, press releases, etc. Framed posters were also presented to administrators of USDA agencies (e.g. NRCS, APHIS, FSA, etc) to help NASS promote the census of agriculture.

A Report Form Guide was prepared and distributed as a reference manual for county extension agents, vocational agriculture teachers, USDA agencies, vocational agriculture teachers, colleges and universities, and others to use in helping farmers and ranchers, or other respondents, complete their report forms. The guide included explanations and detailed instructions for completing each item on the sample and nonsample report forms, plus appendixes and an index.

Field Offices assembled and distributed Information Kits to their state and local partners. There were a variety of unique strategies implemented among the states in addition to what headquarters planned and prepared for Field Offices to use. These strategies were uniquely targeted to each Field Office's local audience to be more customized and effective in their areas. Some Field Offices prepared unique letters targeted toward each type of potential agriculture partner such as grain elevators, feed and supply stores, livestock marketing associations, farm associations, local USDA agencies (e.g., Farm Services Agency, Natural Resources and Conservation Service, etc.), and extension offices.

Special Promotional Materials

In addition to the usual press releases, drop-in advertisements, public service announcements, and other conventional publicity materials, NASS used several special promotional items to try to increase public awareness about the agriculture enumeration. These included baseball-style caps, magnets, lid openers, potato chip bag clips, rain gauges, lapel pins, measuring tapes, pens, and pencils. All of these items bore the NASS logo.

CENSUS DATA RELEASE PUBLICITY CAMPAIGN

Preliminary Census Release and Full Census Release Ceremony

On February 3, 2004 preliminary data were released highlighting census demographic information. On June 3, 2004, NASS hosted a ceremony to celebrate the release of the complete 2002 Census of Agriculture results. Invitations were sent to the USDA Under Secretaries, REE Administrators, Assistant Secretaries for Congressional Relations, Administration, and Civil Rights, Chief Economist, Press Secretary, Office of Communications, the Chairman of the World Agricultural Outlook Board, and the media, and other census

supporters and partners. Many Field Offices hosted similar celebrations in their respective states as well as press conferences on the day that the census results were released.

News Releases

Following the completion of data collection for the census, NASS conducted a publicity campaign designed to inform potential users, and the public at large, about the kinds and availability of the data to be published. Again, the activities were coordinated at the national level by headquarters staff but spearheaded at the local level by the Field Offices. Headquarters staff prepared a template press release for Field Offices to modify and use as their state-level press release. There was also a national-level press release highlighting results of the census.

Additional Tools Used to Publicize Census Results

Slide show presentations were prepared and used to publicize the results of the agriculture census. A series of brochures and bookmarks highlighting minority operators was designed and distributed to provide census results. Drop in advertisements announcing “results are available” were prepared and distributed to various newspapers, magazines, and associations and organizations for inclusion in their newsletters.

In addition, as subsequent census products became available (i.e. Congressional Profiles and Rankings, State and County Profiles, U.S. Agricultural Atlas, Ranking: Market Value of Agricultural Products Sold, American Indian Reservations, Farm and Ranch Irrigation Survey, New England Data, Demographics of U.S. Farm Operators, Operators by Race, 2005 Census of Aquaculture), NASS headquarters staff released product announcements describing the new release, its content, and available formats to the media and posted it on the NASS homepage.

Producer and Trade/Professional Meetings

NASS headquarters and Field Office staffs hosted booths, delivered presentations, and participated in a variety of farm and trade shows, professional conferences, agricultural news media conferences, and commodity producers association meetings to help publicize the census. During these events, NASS staff emphasized the importance of the census, and the need for respondents to complete and return their report forms.

Public Relations Evaluation Survey

NASS invests a lot of resources in public relations. However, prior to the 2002 Census of Agriculture, NASS had never conducted an evaluation of the effectiveness of these public relations activities. While every farmer in the U.S. was asked to complete the census, the goal was to improve not only the overall response rate, but also the timeliness of the response. It was an opportune time to conduct an evaluation of the effectiveness of NASS’s public relation efforts.

The evaluation questions were intended to assess the impact publicity had on a respondent’s likelihood to answer the census. Questions were asked to evaluate the successfulness of publicity efforts being conducted by NASS to promote and encourage response to the 2002 Census of Agriculture. These questions evaluated those activities that NASS had previously conducted, as well as new publicity efforts. Two surveys were conducted: a baseline survey in October 2002, and an additional follow-up survey in March 2003. The baseline questions were intended to assess respondent’s knowledge about the census. There was a sample size of 6,000. The survey was by phone only and drawn from the Census Mail List. Questions included knowledge of NASS, knowledge of our Field Offices, preferred method of reporting, knowledge of the agriculture census, familiarity

with publicity for the agriculture census, best avenues to contact farmers and people within the farming community, and whether knowledge of the agriculture census obtained through different avenues made respondents more likely to respond in a timely fashion. While the results of the surveys were not released to the public, they were used internally.

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GENERAL INFORMATION

Data collection methodology for the 2002 Census of Agriculture in the 50 states was similar to that employed during the 1997 Census of Agriculture. Data collection was accomplished primarily by mailout/mailback, but was supplemented with personal interviewing.

Personal interviewing involved the use of both Computer-Assisted Telephone Interviewing (CATI) and traditional face-to-face enumeration. NASDA enumerators under contract with NASS conducted the personal interviews with respondents.

The U.S. Bureau of the Census, National Processing Center (NPC) in Jeffersonville, IN, under contract with NASS, carried out the mailout operations. The NPC mailed initial mailout packages in December 2002 and carried out two follow-up mailings to nonrespondents.

Enumerations for the agriculture censuses in Puerto Rico, Guam, American Samoa, Commonwealth of Northern Mariana Islands, and the Virgin Islands of the United States were conducted separately. See chapters 8 and 9 for details.

FARM IDENTIFICATION SURVEY

The Farm Identification Survey (FIS) was used to screen criteria records before the final 2002 Census Mail List (CML) was extracted on September 1, 2002. The FIS form was designed to screen out respondents who did not have any agricultural acreage, production, Federal farm program payments, or the potential for future agricultural sales. There were two FIS samples. One sample was mailed on April 17, 2002 with a non-response follow-up mailing conducted May 15, 2002 through May 18, 2002. The second sample was mailed mid-July 2002 and did not have a follow-up mailing for non-response.

MAILOUT AND FOLLOW-UP OPERATIONS

Background

NASS contracted with NPC to handle the mailout, check-in, and data capture processes for the census. The NPC received assembled mail packets from private print contractors, addressed the report forms using name and address files provided by NASS, and conducted the mailings of the initial and two follow-up mailings.

Each mail package contained a cover letter, instructions, a labeled census report form, and a return envelope. The report forms for partnership operations on the census mail list received special handling by printing the partnership names on the front of the report form in addition to the name and address label. Also, two report forms going to the same address were combined in one outgoing mail package with a special cover letter explaining to respondents how to complete the report form for the individual operations.

The initial mailout cover letter asked the addressees to respond by February 3, 2003. Two follow-up mailings to non-respondents were also conducted by NPC. The first follow-up was mailed in mid-February 2003 and involved 1.35 million report form packages. The second follow-up occurred in late March 2003 when 646,000 non-respondents were sent a third report form package.

Tagged Records

Prior to the initial mailout, NASS's Field Offices selected records from the census mail list that were directly responsible for enumerating. These records were referred to as tagged records. They included operations that

had existing data collection agreements with the Field Offices, multi-report form census packages with 3 or more report forms, partnership operations with 7 or more partners, and 2002 ARMS survey records.

There were approximately 30,000 tagged records in the census that were labeled at NPC and shipped to the Field Offices for enumeration. The Field Offices enumerated the tagged records via personal interviews, telephone interviews, or in some cases via mail from the Field Office. Tagged records were excluded from the NPC initial mailout and both follow-up mailings. Once enumerated, report forms for tagged records were sent to NPC for data capture.

Table 5-1. Summary of 2002 Census of Agriculture Initial and Follow-up Mailouts

Initial mailout and follow-up mailings	Material sent	Mailing dates	Report forms mailed (1,000)
Initial mailout	Letter and report form	December 16, 2002	2,814
Follow-ups (mail):			
First	Letter and report form	February 7-14, 2003	1,517
Second	Letter and report form	March 27-31, 2003	647

Regionalized Report Forms

The two basic report form types – nonsample and sample – were regionalized for 12 of the 13 regions (excludes Alaska which had a sample version only) by preprinting on the report forms the predominant crops grown in each region. Preprinting the predominant crops grown in each region reduced not only respondent burden, but also increased the efficiency and accuracy of the data processing and tabulating activities. A state specific sample form (02-A0213) was designed for Alaska because of the differences in Alaska agriculture. In addition, both nonsample and sample report forms for regions 8 and 10 included a section that collected information on activity on American Indian Reservations. General (nonregionalized) nonsample and sample report forms were developed for informational and training purposes. The states included in each regional grouping for 2002 are shown in Table 5-2.

Table 5-2. Summary of States Included in Each Region by Region Number: 2002

Region	States
1	Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, West Virginia
2	Illinois, Indiana, Iowa, Kansas, Nebraska, Ohio
3	Michigan, Wisconsin
4	Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia
5	Florida
6	Arkansas, Louisiana, Mississippi, Missouri, Oklahoma
7	New Mexico, Texas
8	North Dakota, Minnesota, Montana, South Dakota
9	Colorado, Nevada, Utah, Wyoming
10	Idaho, Oregon, Washington
11	Arizona, California
12	Hawaii
13	Alaska
14	General report form for training

Initial Mailout

The initial mailout took place during the middle of December 2002 and totaled 2.80 million packages. This differs from the number of records due to multiple report forms in some packages. Mailout was managed by the Census Bureau's National Processing Center (NPC) in Jeffersonville, IN. Standard A postage was used for most of the mailing packets, including institutional, research, American Indian reservation farms (previous censuses used the term Abnormal); partnerships, and Hawaii addresses. First-class postage was used for packets addressed to multi-units (respondents with more than one operation) and for late/new mail list additions and remailing Undeliverable As Addressed (UAA) records. Initial mailing and follow-up activities associated with Alaska were all mailed first class and was the responsibility of the Washington Field Office. Quantities mailed by form type during the initial mailing are detailed in Appendix C.

Follow-up Mailings

Two follow-up mailings to non-respondents were also conducted by NPC. The first follow-up was mailed in mid-February 2003 and involved 1.52 million report forms. The second follow-up occurred in late March 2003 when 646,000 non-respondents were sent a third report form package.

Not all mail packets were deliverable as originally addressed. Mail packets that were Undeliverable As Addressed (UAA) were returned to the NPC. Those UAAs received from the post office with address corrections were checked-in, the addresses were updated, and they were included in the UAA re-mail operation. If no corrected address was available, electronic files of these UAAs were transferred to the Field Offices where Field Office resources were used to determine if a better address was available. If a better address was found, the address was corrected and a mail package was sent from the NPC facility in Indiana to the new address. Since this was the first time these respondents received the census report form, the mail packets included a special cover letter. Approximately 190,000 UAAs were received during census processing and 116,000 of these were updated with corrected addresses and remailed.

All Alaska follow-up mailings were conducted by the Washington Field Office. The Alaska report forms were returned to the Washington Field Office, not NPC.

Based on a total Census Mail List of 2,851,985 respondents, (report forms mailed/delivered to respondents) the disposition of the report forms based on check-in results, is shown in Table 5-3.

Table 5-3. **Summary of Check-in Results: 2002**

Disposition	Records
Total mailed	2,851,985
Total receipts	2,290,388
Responding farms	1,486,868
Responding nonfarms	802,716
Receipts not processed	804
Nonresponse	489,514
Undeliverable as addressed	72,083

FOLLOW-UP ACTIVITIES

Background

Operating concurrently with NPC's data collection efforts, the Field Offices targeted selected groups of census non-respondents for enumeration. These efforts were referred to as Advance Follow-up (ADVFU), Must Case Follow-up, Low Response County Follow-up (LRC), and Last Call follow-up.

Advance Follow-up

The sample for ADVFU was drawn and distributed to the States, but the activity was cancelled due to budget concerns. NASS was operating under a Continuing Resolution at the time and there was concern that the

resources would not be available for subsequent data collection activities. The ADVFU was scheduled to occur between February and April 2003.

Must Case Follow-up

Must Case Follow-up was a very important component in ensuring a complete census. Must cases are known large operations, the absence of which may significantly affect the accuracy of census results. Each active Must operation had to be enumerated, or if no longer in operation, their non-farm status documented. Because of the potential importance of Must cases, they were not eligible for non-response weighting. The Field Offices were responsible for enumerating or resolving all Must cases. CATI calling of non-respondent Must cases was undertaken by Field Office staff in March 2003. Extensive efforts were made to contact and enumerate these operations.

Must cases not completed through CATI follow-up were eligible for replication; so long as replication was not used to complete the record for the 1997 census. Replication was accomplished by using existing control data and subsequently processing the record through the complex edit. Any data problems identified by the edit were resolved by the Field Office. Must records not enumerated by CATI and that could not be replicated due to lack of control data were completed using secondary sources such as the County Extension Service or the Farm Services Administration. The workload of this operation was about 122,000 records. Field Offices Must record follow-up activities ended late June 2003.

Low Response County (LRC) Follow-up

The Low Response County follow-up activity was used to increase the response rate in all counties to at least 75 percent. CATI was used for this follow-up activity. In early April 2003, NASS's Sample Design Section identified nonresponse cases in counties with a response rate of less than 75 percent.

These names and addresses were transmitted electronically to the appropriate Field Office and incorporated into their CATI instrument. CATI follow-up activities began mid-April 2003 and continued until all counties reached the 75 percent response rate. Automated procedures were employed to monitor the number of respondents needed and completed. When the required number of completions had been achieved for a given county, LRC activity was suspended.

Last Call Follow-up

Last Call Follow-up was used to increase the overall U.S. response rate and was conducted via CATI. This activity was conducted if a state's response rate was less than the 1997 response rate at the completion of the Low Response County (LRC) follow-up. Non-response records were identified for this activity once the LRC follow-up was closed out.

Implementation dates for this activity varied by Field Office. Generally, the activity, if needed, began sometime between April and June 2003. Last Call non-respondents could be contacted by enumerators in the respective Field Office or in one of the four NASS Telephone Calling centers.

The estimated workload for Last Call was approximately 400,000 records. Calls were first targeted to records in low response counties, because it was imperative that each county attain a 75 percent response rate at the very minimum. Input files were delivered to the Field Offices using the census data distribution system, and the CATI system processed and managed the data collection process.

Telephone Operations

Two kinds of telephone operations were used for the 2002 Census of Agriculture (except in Alaska), an Incoming Telephone Call (ITC) system and a Computer Assisted Telephone Interview instrument (CATI). The ITC system assisted respondents with questions throughout the census data collection period. The CATI collection instrument was developed with different branching for the long and short regional report forms. When possible, ITC operators used the CATI instrument to complete report forms.

Incoming Telephone Call System (ITC) – A toll-free telephone number was established and printed on every report form. The intent of the toll-free number was to answer respondent questions and concerns pertaining to the census, and to assist respondents in completing their report forms. Calls to the toll-free number were routed to one of four call centers located in the Kentucky, Montana, Oklahoma, and Wyoming Field Offices. To assist ITC operators with respondent questions and requests, the ITC system provided guidance on how to handle the various types of calls, e.g. respondent’s considered themselves as not involved in agriculture, refused to complete the report form, needed a replacement report form sent, etc.

If an ITC operator could not resolve the caller’s question, a call back form was completed by the operator and e-mailed to the respective state Field Office census coordinator to use to follow-up on the respondent’s call. The coordinator either called the respondent back or forwarded the request for a call back to another statistician in the office for resolution of complex issues. If the request for a call back was directed to an incorrect Field Office, it was e-mailed to the coordinator in the correct Field Office.

The ITC system also recorded the kind of calls received, e.g. “not in agriculture business,” refusals, receipt of two or more report forms and not sure which to complete, needs a report form, name and address changes, etc. Each kind of call, along with the number of call backs, was entered into a data base and tallied. This information was available on the NASS intranet in the Management Information System reports. The ITC help line was operational throughout the entire data collection period.

Computer Assisted Telephone Interview Instrument (CATI) – A single CATI instrument was developed with different branching for the sample and nonsample regional report forms. The CATI instrument was used, not only by ITC operators, but by the Field Offices throughout the data collection phase of the census. All CATI operations were conducted from the NASS Field Offices.

The Field Offices used CATI for Must cases follow-up and Last-Call follow-up. The last call phase was a combination of follow-up work in low response counties (i.e., those counties with response rates below 75 percent) and for nonresponse follow-up work that replaced a fourth mailing of the report form package. CATI collected data were electronically transmitted by the Field Offices to the main census data file. The data then were processed electronically, eliminating the need for paper report forms.

Field Office personnel were responsible for training CATI enumerator staff. Training included an introduction to the census, overview of the paper report form versions, and all special instructions. The CATI enumerator staff was given walk-through training during each different phase of data collection. Training included practice training modules that helped them orient themselves to the CATI instrument. In addition, enumerators were given reference materials for use during the interviews to help guide them through various procedures. CATI interviewing began in February 2003 and continued through July of the same year.

CITRUS CARETAKER CENSUS

Background

Between May 2002 and February 2003, NASS conducted a Citrus Caretaker Census, in connection with the 2002 Census of Agriculture in Arizona, Florida, and Texas. The census was planned and managed by NASS headquarters staff and the NASS Florida Field Office.

Citrus caretakers were contacted because, as a group, they were the most knowledgeable source of the needed information. Grove owners are often typically absentee owners, and therefore were not contacted because they typically are less knowledgeable about the day-to-day operations of the groves.

List Building

List building of caretakers and their respective grove owners was initially undertaken during the Fall of 2001 in Florida and updated in May of 2002. List building in Arizona and Texas occurred during May of 2002. This activity involved making contact with previously known and newly identified citrus grove caretakers based on information obtained from the 1997 Citrus Caretaker census and recent NASS citrus surveys to:

- Explain the purpose of the 2002 Census of Agriculture and the reason for obtaining information from caretaker operations;
- Obtain cooperation for data collection;
- Obtain and update the list of grove owners from the 2001-02 season.

The name and address of each identified grove owner, whose grove was managed by a caretaker, was researched to ensure that owner was listed on the Field Offices' list frame and linked to the correct caretaker. New names and links were added to the list frame as needed. Information was updated as appropriate. The Citrus Grover Owner Listing was used to facilitate this work.

Data Collection

For the 2002 Citrus Caretaker Census, two significant changes from previous caretaker censuses were implemented: procedural – timing of enumeration activities with respect to completion of harvest activities, and methodology – enumeration of grove owners as farm operators instead of the grove caretakers.

Enumeration of citrus caretakers for the 2002 Citrus Caretaker Census took place between May 2002 and February 2003 for all three States. This change in enumeration timing was an effort to improve accuracy in the reported data. Contact with citrus caretakers was done in conjunction with data collection efforts associated with NASS's ongoing surveys, e.g. quarterly production survey, chemical use survey, labor use survey, and objective citrus counts and measurements survey. This approach better utilized NASS resources and staff, and reduced respondent burden.

The other major change for the 2002 Citrus Caretaker Census was that caretakers were no longer considered agricultural operators. Rather, citrus caretakers were perceived as performing an agricultural service for the grove owners. Grove owners, for farm count purposes, were considered to be the operators. Data provided by the caretakers were prorated to the owners, based on the owners' acreage, and transcribed onto the respective owner's census report form.

Data collection activities involved both NASS Headquarters and Field Office staffs. Headquarters staff, with input from the Field Offices, developed a Citrus Caretakers report form, a Citrus Grove Owner Listing, an Interviewer's Manual, and a Caretaker Pre-contact letter. The Citrus Caretakers report form was similar to the census sample form but only asked questions pertaining to citrus production activities. However, provisions were made on the form to capture comments and data about non-citrus production activities if any existed.

Headquarters staff formulated the schedule of census activities and developed the Citrus Caretakers report, Citrus Grove Owners listing sheet, and the pre-contact letters. The Florida Field Office printed and shipped copies of the Citrus Grove Owner Listing forms and the Citrus Caretaker report form to the Arizona and Texas Field Office by late May 2002. Individual Field Offices reproduced and addressed the pre-contact letters and, if needed, printed additional copies of the Citrus Grove Owners listing sheet.

Once grove owner information was updated and added to the census list frame, grove owners' records were tagged. Report forms for tagged records were generated by the National Processing Center (NPC) and sent to the respective Field Office. As a result, tagged census report forms were excluded from census mailout and all follow-up activities conducted by the NPC and became the responsibility of the Field Office for all data collection activity.

In preparation for data processing, collected caretaker data were transcribed to the respective individual grove owner's report form. Grove owners records that were previously tagged and had a report form generated by NPC were returned to NPC for optical data capture. Data for grove owners not previously tagged whose report form was generated in the Field Office were entered into data entry software in the respective Field Office and electronically added to the census data base. Non-production data, such as operator characteristics, were imputed by the computer editing process during data processing. This process was similar to that undertaken in the 1997 citrus caretaker enumeration.

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INTRODUCTION

Census data processing is a series of steps that enable reported data to be captured electronically, reviewed for reasonableness and consistency, and tabulated. The 2002 census data processing system was designed to handle a large volume of paper report forms and a large number of report form images resulting from the use of automated data capture. Components of the census data processing system included: 1) Receipt and check-in of respondent reported data, 2) resolution of problems associated with returned report forms (e.g. correspondence included or 2 or more report forms (2+) returned for a single operation, 3) data capture, 4) editing of information on the report forms, and 4) data tabulation and application of nondisclosure requirements. Receipt and digitizing of data, review and resolution of data errors and inconsistencies, and data tabulation for the 2002 census were split between three locations.

Receiving respondent report forms and capturing the reported data of approximately 2 million report forms was the responsibility of the National Processing Center (NPC) in Jeffersonville, IN. A significant portion of data review and resolution of data errors and inconsistencies was completed by NASS Field Offices. A portion of the data review and analysis effort was completed at NASS headquarters in Washington, D.C. Data tabulation and application of the disclosure analysis was completed by headquarters staff and reviewed by the Field Offices.

AUTOMATED TRACKING AND CONTROL SYSTEM

A system was developed to track each report form throughout each step of processing so NPC could control document handling during processing. This system was called the Automated Tracking and Control System (ATAC). ATAC served multiple purposes including the following:

- Identified the location of each report form during processing;
- Provided daily status updates to NASS headquarters;
- Produced batches for scanning;
- Generated processing reports.

ATAC utilized an Oracle® database containing records for all cases on the census of agriculture mail list. This database was populated initially from mail files provided by NPC's Document Services Branch and updated continuously from NASS headquarters. ATAC database records included both a unit location and status field. The initial unit location for all records was set to Unit 00 and Status 00. As the report forms were received in the mail from the respondents and moved through the processing pipeline, both the unit location and the status field were updated to reflect each report form's location and status. ATAC also was used to produce real time progress reports. ATAC tracked work through all of the NPC processing steps up to Automated Data Capture.

RECEIPT, CHECK-IN, AND RESOLUTION OF ASSOCIATED PROBLEMS

Activities conducted at the NPC included:

- Received and checked-in the report forms;
- Sorted the returned report forms and removed the contents from the envelopes;
- Evaluated and responded to census-related correspondence;

- Reviewed nonagricultural reports and 2+ reports;
- Scanned the report forms and created images for data retrieval;
- Captured/retrieved reported data from scanned images using Intelligent Character Recognition (ICR);
- Transmitted data and image files to NASS headquarters;
- Maintained files that contained all the report forms received.

Post Office Box Numbers and the 56-Pocket Mechanical Sorter

Two different types of report forms (sample and non-sample) were mailed out with return envelopes that had different post office box numbers printed on their postage-paid return envelopes. Separate PO boxes ensured the form types were separated by the Post Office before delivery to NPC. This allowed NPC to efficiently sort by type all census report forms. Upon receipt trays were visually scanned to ensure that each tray contained one type of report form. The trays were placed on rolling bins and moved to the 56-pocket mechanical sorter.

The sorter operator jogged the receipts to make certain they did not stick together and that the address barcodes were visible through the windows of the envelopes. The forms were then placed upside down facing the laser, and the sorter was started. The laser read the barcode showing through the address windows on the return envelopes which generated a check-in action and state sorted the forms into one of the pockets on the sorter.

The unit also received materials that were unable to be processed with automated check-in equipment (e.g. non-visible barcodes, correspondence, etc.). Correspondence was scanned to determine whether it was a congressional, i.e., the return envelope or the letterhead was from a Senator or Member of the House of Representatives, or any representative of the legislative or executive branch of the Federal Government, or if the letter was from a respondent and indicated that a copy had been sent to a Senator or Member of the House of Representatives. Congressional cases were referred to the unit supervisor. All other cases required the clerical staff to transcribe the State Person Operator Identification (StPOID) of the case on the upper right hand corner of the letter and staple the correspondence to the back of the report form. Correspondence was referred to the Problem Solving Unit daily.

Agriculture census receipts (in envelope) and UAA (undeliverable as addressed) were checked in on the 56-pocket sorter. Check-in transmittal sheets were attached to each bin of work upon completion. The bins of mail receipts were then flowed in a “first in-first out” principle to the Remove Contents and Sort Unit.

Report forms that could not be checked in and sorted on the 56-pocket mechanical sorter because the barcode was not visible through the window of the envelope or because the barcode could not be read by the laser were wanded or keyed in order to check them in. After completing check-in, the report forms were sent on to the Remove Contents and Sort Unit for further processing.

Remove Contents and Sort

Once report forms were checked in, the contents were processed in the order in which they were received. The contents of each envelope were removed, examined, and sorted into the categories shown in Table 6-1.

Table 6-1. Receipts Sort Categories: 2002

Category	Description
2+ cases	Two or more reports received in the same envelope or reports received with additional identification (ID) numbers written in the 2+ boxes on the front of the report form.
Special cases	Returns with attached correspondence, remarks on the front or back, blank reports, and reports with acres in the place, but no crops or livestock. Damage to the report form that prevents scanning, etc.
Good receipts	All cases not qualifying as a 2+ or special case.

State sorted work was also maintained by state and was transmitted to the proper unit for further processing. The 2+ Cases were sent to the Problem Solving Unit, and the special cases to the Special Case Processing Unit. Good receipts were sent to the Batching Unit where they were wanded into scanning workunits and then sent to the Scanning Hold area awaiting scanning.

PROBLEM RESOLUTION OF RETURNED REPORT FORMS

Correspondence

Correspondence generated in processing the 2002 Census of Agriculture totaled approximately 20,000 pieces. The need for recontacting a respondent was determined by the staff in the NPC Problem Solving Unit where the correct form letter was assigned. The letters and forms needed for mailing the correspondence were printed and assembled in the mailout area.

Special Cases

Special cases were report forms identified in the Remove Contents and Sort Unit that had attached correspondence, remarks on the front or back, were blank, had acres in the place reported but no crops or livestock, or reports that were determined to be unscannable. The special case processing staff reviewed the report forms and attached materials using a condition action table based procedure. The use of this procedure resulted in the clerks determining if the special case was in-scope of the census of agriculture and the form was ready for imaging and data capture or if the respondent did not meet the farm definition and was out of scope of the census. Of the approximately 742,000 special cases processed, 21 percent were in-scope, 58 percent were out-of-scope of the census, and 21 percent were referred for additional processing such as correspondence or telephoning the respondent.

Table 6-2. Special Cases Disposition: 2002

Priority groups	Disposition
In-Scope (I/S)	Batched for keying
2+ Cases	2+ processing unit
REM, R-AG, or R-LL ¹	Large farm coverage unit
Form letter assigned	Correspondence reading
Correspondence analyst	NASS Agriculture Analyst
Successor, partnership, or claims filed	Research clerk, special case unit
Out-of-Scope (O/S)	O/S wandering within unit/ forward checked forms to central files
Conservation Reserve Program (CRP) and Wetlands Reserve Program (WRP)	Batch and hold in unit

¹A case was coded REM when attached correspondence conflicted with data reported on the form; code R-AG indicated doubt about farm status, or that the place was a partnership, but the name of the senior partner was not provided; code R-LL indicated that some land was rented out, but that crops were reported. NPC processed approximately 742,000 special cases between January 6 and May 23, 2003.

2+ Processing

2+ cases were identified in the Remove Contents and Sort Unit and occurred when:

- Two or more report forms were mailed to the same individual;
- Two or more report forms were mailed to different individuals involved in the same operation;
- Unrelated report forms were mailed to an accountant or a bank trust manager who returned multiple report forms together in the same envelope.

All 2+ cases were reviewed by the staff in the Problem Solving Unit to determine whether they involved a single or multiple farm operation, and to ensure that all related report forms were checked-in and the records and farms were properly linked within the census mail file.

The clerical staff performing 2+ processing had to determine whether all the report forms involved in a specific 2+ folder had to be linked to prevent duplication of data. That is, did all the forms received together represent the same operation. Clerks interactively assigned linkage codes to each report form ID that required linking. A primary-linkage code was assigned to the report form that had been completed by the respondent while a secondary linkage code was assigned to any duplicate reports returned by the respondent. 82,000 2+ cases were resolved during 2002 Census processing at the NPC.

DATA CAPTURE

Overview

The 2002 Census of Agriculture data capture operation was the first agriculture census to use Automated Data Capture (ADC) technology. ADC uses computer software to recognize handwriting, handwritten marks, and computer-generated numbers or letters on a report form.

The goals of ADC were the following:

- Capture a higher volume of data faster and more efficiently than previous censuses;
- Maintain a level of data quality consistent with past censuses;
- Increase access to respondent reported data.

In addition the scanning process used for the ADC allowed retrieval of the images for review after ADC was completed. Image retrieval was cost efficient and provided a time-saving alternative to storing and retrieving paper documents.

During the preliminary phases of census planning, several tests were made to ensure that ADC and imaging would in fact be a better approach. Throughout the development process, several tests were undertaken to ensure that imaging would capture and transmit the volume of report forms necessary for the census and meet the goals of tracking and cost effectiveness.

Planning, Development, and Testing

NPC contracted with the Coronado Group of Bethesda, MD for the development, testing, and implementation of a turnkey ADC and imaging system. The development process involved using respondent reported data from NASS's 2000 Retail Seed Survey and the 2000 Census of Agriculture Content Test.

The ADC system, as designed by the Coronado Group, utilized three types of recognition engines: Optical Mark Recognition (OMR), used to automatically read check boxes; Optical Character Recognition (OCR), which read machine print (e.g, label information); and Intelligent Character Recognition (ICR), which interpreted hand-written characters. Those entries where the recognition engines were unable to interpret the characters were keyed from the image by a data entry operator.

In early 2000, development began with a field test of the 2000 Retail Seed Survey. An abbreviated report form (two pages, back-to-back) was developed with the goal of making the form respondent, ADC, and imaging friendly. A total of 489 report forms were captured and evaluated.

Development continued with the use of imaging and the ADC method of data capture in the 2000 Census of Agriculture Content Test, conducted in January of 2001. This involved a 24-page report form with 3 different panels. One panel, comprised of approximately 2,400 report forms, was processed using ADC. The remaining report forms were processed with a key from paper system for comparison.

In an effort to reduce the size of the Census mail file, a 2002 Farm Identification Survey (FIS) was conducted in the summer of 2002. The FIS report form was designed as a one-page report form with check boxes; no numerical data was reported by the respondent. The FIS was data captured with an ADC system developed by the NPC programming staff. This system was different from the system that would be used on the 2000 Census

of Agriculture Content Test and that would be used to capture the 2002 Census of Agriculture data. The FIS did provide NASS and NPC an opportunity for large-scale testing of scanning and image file delivery.

Prior to the 200 Census of Agriculture Content Test, test decks were designed and used for various elements of the application, including detection of handwritten entries/marks, contextual rules, behavior with associated zones, recognition accuracy, anomalies, and formulation of Correct From Image (CFI) operator instructions.

After pretesting problems were identified and corrected, a User Acceptance Test (UAT) was conducted in late November 2002 over a period of three days. The purpose of the UAT was to test all aspects of the data capture system (functionality, system performance, batch integrity, load and error rate) and confirm that all application and system requirements were met.

Implementation and Production

Production was scheduled to begin early January of 2003. Planning for the clerical operations occurred during the summer of 2002. These preparations included, but were not limited to, developing the requirements for pre-scanning and post scanning operations.

Operational units to meet these needs were staffed mid-December 2002. To achieve a smooth flowing operation, the following clerical units were established:

- Check-in – Receipt and sorting of report forms from the postal service;
- Open and Sort – Sorted forms were forwarded to open and sort from check-in. Forms were removed from the envelopes and the contents were reviewed and sorted into good receipts or a special case category.
- Clerical Special Handling – This operation involved both the Special Case Processing and Problem Solving Units. These units reviewed report forms identified in the Open and Sort Unit with a high probability of being out of scope (O/S) – not meeting the definition of a farm – of the census of agriculture. Scope determinations were made and only those cases determined to be in-scope (I/S) – meeting the definition of a farm – were sent to data capture. The Problem Solving Unit was also responsible for repairing report forms rejected from data capture because they were determined to be unscannable.
- Batch for Imaging – Batching clerks batched in-scope forms into scanning batches of 30 forms. Bins of batched work were taken to the guillotine area, where the left spine was guillotined from the forms. After guillotining, batches were placed in pre-scan hold.
- Pre-scan Hold – The pre-scan hold area had steel shelving for batches by state and form type. Batches from guillotining were removed from the bins and placed on the shelving.
- Post-scan Hold – After scanning, batches were held for 3 days in post-scan hold, and then sent to be boxed, palletized, and stored until the census was completed.

Transmission of Data and Images

A computer program was designed to electronically transmit completed data and image files from NPC to a remote server at the USDA, National Information Technology Center (NITC). From NITC, the images were swept into the NASS image file cabinet and made available to the NASS Field Offices. Respondent entries captured by the ADC system were transmitted as ASCII files separate from the image files. Data file transmission was synchronized to occur with the image file transmission. There was a slight disconnect as the

data transmissions were programmed to take place four times each day and image files were transmitted, when available, every 20 minutes throughout the day.

COMPUTER PROCESSING

General Information

After data were captured via the ADC system and delivered to NITC along with the corresponding images, the data were formatted and edited. The data from each report form were edited, item-by-item, in a comprehensive check for consistency and reasonableness. During the edit, the computer corrected erroneous or inconsistent items, supplied missing data based on similar farms in the same county, and assigned any classification codes required.

Format

Computer processing began with the format program. This program converted the data records into a series of fixed and variable portions. Historical data for individual items were added at this time and were compared to the reported data for completeness and reasonableness. The format program also carried the flags set during data entry to the formatted records and set new flags for any problems identified during the formatting cycle.

Computer Edit

Computer editing is the automated process of checking and reviewing reported data to make it consistent and reasonable within the report form. The complex edit and imputation programs were designed to carry out all hundreds of individual edit checks on each census record.

Prior to submission to the complex edit, formatted data files were sorted by state. The data from each record were subjected to a detailed, item-by-item, computer edit. This edit:

- Determined whether each record represented an agricultural operation meeting the census farm definition and deleted out-of-scope operations from the file;
- Assigned farm classification codes needed for tabulating the data, including size of farm, tenure, product sales, type of organization, and North American Industry Classification System code;
- Identified nonsample farms representing farms that met the certainty criteria for each state, and converted these records to sample records;
- Checked consistency between and within sections of each record;
- Checked for reasonable relationships between and among data items, values for various sizes of farms, and combinations of commodities; and
- Checked that geographic, legal, and physical constraints were met.

The computer edit operation also imputed missing data for farms in the census files. Whenever possible, edit imputations, deletions, and changes were based on other data in the same record, or for some items on historical

information from the previous census. Other missing items were calculated based on reported quantities and average commodity prices in the same state. When these methods could not be employed, the imputation program used information reported by an other, similar farm operation in a nearby geographic area.

Data records that failed to meet the census farm definition, or that had undergone substantial computer-generated changes to the data were reviewed to ensure the data had been keyed correctly and/or that the changes were justified.

Analytical Review

After the record was processed through the computerized edit, the data were reviewed through an interactive analytical review system. Analytical review is the review of all census of agriculture data items, data values, and a variety of data relationships for all states and counties. It allowed statisticians, using an interactive computer system, to detect and correct incomplete or erroneous data before they were tabulated for publication. The analytical tables included ratios, frequencies, measures of data imputation, and other calculations designed for data problem detection. Analytical review was a decentralized process involving NASS's 45 Field Offices and selected headquarters statisticians.

After Analytical Review, the data underwent final weighting which included both non-response and coverage weighting. A small, state-level table of selected variables was created for each state and reviewed to ensure that the final weighting had not caused significant shifts in the data. A Final Data Review and check-off was accomplished also using the Analysis System.

TABULATION FOR COUNTIES, STATES, AND THE UNITED STATES

As data were keyed, edited, and reviewed, the format for the published tables was determined. For 2002 the summary was written in the SAS software language. The summary calculated the value of each published cell, for each state, the US, and New England. It also saved information that was needed for the disclosure system which determined if each cell would be published or suppressed, to protect individual data. The summary also retrieved data from the 1997 publication for cells that referred to the previous census. There were approximately 8 million 2002 cells published. The summary provided a file for each table to the publication system. This file contained the value of each 2002 cell, 1997 cell, and whether the cell was to be published or suppressed to avoid disclosing individual data.

DISCLOSURE ANALYSIS

The law which authorizes the census of agriculture also prohibits publishing information that could be used to identify individual respondents. To ensure that confidentiality was maintained, all summarized data were checked prior to publication in a procedure called disclosure analysis. Disclosure analysis involved a review of each data table that had items suppressed that, if published, would: (1) result in direct disclosure of data reported by a respondent, or (2) reveal information about a respondent by derivation – that is, by a data user adding or subtracting a published subtotal from a published total to reveal individual data.

The disclosure guidelines set lower limits on the number of farms that were required to have reported an item before it was published. Since some tables included identical information arranged under several different classifications, the suppression of data in one table required the suppression of the same data in other tables. Publishing the number of farms in a particular size or other category was not considered a disclosure. Disclosure review was completed in Headquarters and the Field Offices.

Chapter 7. Data Quality and Coverage Evaluation

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INTRODUCTION

Regular coverage evaluations of the agriculture census began with the 1945 program, and the first results of the evaluation study were released as part of the 1950 census publications. Since then, each agriculture census has been routinely evaluated for accuracy and completeness of the farm count and coverage of selected data items (e.g., land in farms, total value of agricultural products sold, and others). Prior to the 2002 Census, the methodology used was relatively unchanged – a mail list was enumerated and an area frame survey was used to estimate the number of farms not on the mail list. During these censuses, with the exception of 1978, the estimate of farms not on the mail list was not included in census totals. For the first time in 2002, the list and area frame totals were combined and the census totals included both the farms counted on the list as well as those not on the mail list.

HISTORIC HIGHLIGHTS

Sometimes it is best to know where you have been before deciding where to go. A significant portion of the evaluation program was based on experience and lessons learned from prior census evaluations. The following offers a very brief census by census synopsis of how the issue of coverage error was addressed over the years.

1950: Coverage estimates for the 1950 Census of Agriculture were based on check data (e.g., cotton ginnings) and a re-interview of 6,000 farms selected from 1,000 area segments. The intent of the re-interviews was to measure not only coverage error, but also reporting error.

1954: Overall coverage for the 1954 census was evaluated by a re-interview process. There were 772 rural segments used (contained 2,800 farms) and 700 list farms selected from areas near the segments. Contacts were made in an effort to find duplication and to verify farm status. Additionally, there were 3,000 urban segments used; farm operations found in those were re-interviewed with some data verification taking place along with classification measurements. Contact was also made in cases when census data and coverage data varied appreciably.

1959: Coverage for the 1959 Census of Agriculture was evaluated by making comparisons with check data (e.g., processors' data) and several sample surveys. There were 1) 772 rural area segments, 2) a sample of some urban areas, and 3) a sample of census respondents. The first two surveys provided a Not-on-the-Mail List (NML) measure. To determine classification error, a sample of 2,500 farms (less than 5,000 acres in size) was selected from census respondents in the 772 segments. This sample was supplemented by 525 farms (more than 5,000 acres in size) selected from 200 separate segments located largely in the western states. Data were collected a few weeks prior to the census for half the 772 segments and after census enumeration for the others; names collected were then matched to the census list to determine the NML status. If the name was on the census list and data varied appreciably from the area and list frame data, a recontact was conducted to ascertain truth. On correctly identified farms, an attempt was made to rectify any disparate data.

1964: The coverage evaluation program for the 1964 Census of Agriculture involved 200 counties. Within these counties, 800 segments were constructed, each containing 3 to 4 Resident Farm Operators (RFOs). Selection of the segments was made so as to include ag-urban areas. These segments were supplemented by a pseudo-list sample. List records were selected, and then operations within the segment in which the sampled records were located were then re-interviewed. There was no attempt to measure reporting errors. A weighted estimator was used.

1969: As a part of the 1969 census evaluation program, the area frame used by the National Agricultural Statistics Service for its June Enumerative Survey was utilized. This was the first time the June area frame was used for coverage purposes. The Resident Farm Operator, or open estimator, was used for NML and

Classification Error Survey (CES) estimates. A sample of 1,500 nonfarms was used along with 23,000 RFOs located within the segments. Matching was done against the census of agriculture mail list. Report forms were mailed to the approximately 4,200 non-matches and 3,000 possible matches. Once the data were collected, another attempt to match was undertaken. Problems associated with this evaluation included:

- Of the approximately 7,200 mailed forms, some remained nonrespondents through the entire process;
- Specifications for the matching process called for matching to stop as soon as the first match was found, even though multiple duplicates existed;
- The sample design for the June Survey did not adequately reflect farm numbers because of under representation of urban segments; and
- The enumeration dates for area sample data and census data were different.

1974: The evaluation program for the 1974 Census of Agriculture used NASS's June Enumerative Survey area frame. The Resident Farm Operator (RFO) estimator was used for both NML and CES estimates. A sample of 3,000 nonfarms was used along with 22,000 RFOs. Matching was done with census forms mailed after the process to the nonmatches and possible matches. Once data were collected, a second attempt to match respondents was undertaken. Tests were conducted using a weighted estimator in 5 states – value was determined to have an upward bias due to understatement of total farm acres – and further testing was recommended.

Problems associated with this evaluation approach included:

- Level of nonresponse was too high;
- Records found solely on the Agricultural Stabilization and Conservation Service (ASCS) lists were sampled so not all were added to the final census list. In turn, area records were matched to the non mail list ASCS records. When matches were found, adjustments had to be made in the estimator to reflect the fact that the ASCS list source was sampled;
- Difficulties in searching for matches (thought was that 5 percent of nonmatches were actually on the list somewhere);
- Thorough searches for matches stopped as soon as a first match was found although multiple duplicates may have existed. In some cases, multiple duplicates were identified just by chance;
- June Survey underestimated farms in urban areas;
- The enumeration dates for area frame data vs. census data were different; and
- Classification was not made on four percent of matched cases due to missing forms.

1978: The 1978 evaluation program did not use NASS's June Enumerative Survey area frame. Rather, the census list was supplemented with 6,400 area segments representing rural areas called Census of Agriculture Area Sample (CAAS). Data for nonmatches in these area segments were expanded to adjust state level numbers for Not-on-the-Mail List (NML). Two additional surveys were conducted to further evaluate coverage. The first survey used was based on a sample from the Census Bureau's Annual Housing Survey (AHS) which mainly targeted farmers living in urban areas not covered by CAAS. It also had a smaller sample

targeting rural areas (sample size 72,000 units). Again, this provided an NML number. The second survey was the Post Enumeration Survey (PES). This was basically a re-interview of a sample of households found in the Census of Agriculture Area Sample. Data collected on the PES re-interviews were then used to further adjust the area numbers that were then used to adjust the census number. State level values were not adjusted to reflect results from the PES and AHS (only regional and national levels). In essence, the PES and AHS samples attempted to measure census list frame misclassification and undercount/overcounts from the CAAS. Problems associated with this approach were:

- Too many farm operators were missed in Census of Agriculture Area Sample (CAAS);
- Often CAAS data were based on observations or data provided by someone other than operator of the land;
- Misspelled CAAS names or census names resulted in CAAS overcounts based on PES; similar problems due to alternate addresses and alternate names for the same operation;
- Nonresponse was too high;
- Many cases could not be resolved as to whether they were a farm or nonfarm.

1982: For the 1982 Census of Agriculture evaluation program, the Census of Agriculture Area Sample (CAAS) was again conducted, but due to budget constraints it was not supplemented by the Annual Housing Survey (AHS). Also, the CAAS was reduced to 344 segments. A list sample of 4,700 census names was selected to further measure coverage error. This was the birth of the Classification Error Survey (CES). The nonfarms, Undeliverable As Addressed (UAAs), and one-half of the farms were matched back to the list in an effort to detect duplicate records. A sample of nonduplicates and all potential duplicates were re-interviewed (300 cases) to determine classification error. It is important to note that the dual system estimator was introduced to account for the fact that the area frame and the list were both incomplete although they both were attempting to measure the same thing (i.e., number of farms). Problems associated with this evaluation included:

- Sample sizes were too small (about 3,440 operators in the CAAS and only 300 CES interviews);
- Nonresponse was too high.

1987: The June Enumerative Survey area frame was reinstated as a tool to measure the NML only, with the Classification Error Survey (CES) again used to measure classification error and duplication. The area frame sample size was increased 20 percent with ag-urban areas being the principal target. Also, more intensive screening was dictated with additional questions added to the area report form itself. Only Resident Farm Operators (RFOs) with indicated agricultural activity were used. Names from the June Survey area frame were matched to the census list frame with all nonmatches mailed a census form. Once the census form was returned rematches were done as was a final scope determination. The CES sample was 18,500 records selected from the initial census list. Only census respondents were recontacted (approximately 15,300). There were 100 nonrespondents and about 900 cases where the true underlying classification could not be determined, so the effective sample size was further reduced. The dual system estimator was again used since it was believed that the area frame and the list frame both failed in their attempts to measure the total farm universe. Census farm number used in the calculation took into account the Classification Error Survey results. Significant problems with this evaluation included:

- CES sample sizes were too small to provide state level estimates;
- True underlying classification could not be determined on 619 area cases;

- Variation in enumeration periods for the June survey and the census impacted the farm or non farm determination for some records;
- Duplication determination was often difficult when data for a specific farm were only partially duplicated across multiple report forms.

1992: The 1992 census evaluation process mimicked the 1987 program. One major difference was the adoption of the weighted estimator as opposed to the use of Resident Farm Operators (RFOs) only. This greatly increased the number of area frame names that the census received from NASS. An updated file reflecting any farm status changes discovered during the December Area Survey was incorporated. Area frame names were matched to the census list, with nonmatches being mailed a census form. Nonresponses were imputed. The initial CES sample consisted of 21,300 records, but only census respondents were in the final sample (approximately 16,800). Search routines were performed to locate duplicates. Possible misclassifications were determined by statisticians with cases in question being recontacted for final scope verification. The dual system estimator was again used since it was believed that the area frame and the list frame both fail in their attempts to measure the total farm universe. The census farm number used in the calculation of the dual system estimator took into account CES results. Problems associated with the evaluation included:

- Variation in enumeration periods for the June survey and the census impacted the farm or non farm determination for some records;
- Duplication determination was often difficult when data for a specific farm were only partially duplicated across multiple report forms;
- Classification Error Survey sample sizes were too small to provide state level estimates;
- True underlying classification could not be determined on 205 area cases.

It is important to note that for the weighted area estimator, census farm acres were used as opposed to those collected during the June Agricultural Survey. Information about the computation of the adjustment estimate and other details are included in the 1992 Census of Agriculture publication.

1997: The foundation of the 1997 Census of Agriculture coverage program was based on two surveys, Not-on-the-Mail List (NML) survey and Classification Error Survey (CES). The NML Survey was based on an area frame sample and the CES was based on samples drawn from the 1997 final census list.

Based on these two surveys, the 1997 coverage evaluation program was designed to measure four components of error in the census farm counts. These components were:

- Undercount due to farms Not-on-the-Mail List (NML);
- Overcount due to farms Duplicated or enumerated more than once (DUP);
- Undercount due to farms Incorrectly Classified as nonfarms (ICU);
- Overcount due to nonfarms Incorrectly Classified as farms (ICO).

Area frame surveys were used to measure list frame undercoverage. Names and addresses collected in the 1997 June Agricultural Survey (JAS) and 1997 Fall Area Survey were used to estimate the undercount due to farms not on the census list (NML). These names were matched to the census list frame, and those that did not match

were contacted by telephone or in person to verify whether the operation had reported in the census. Farm operations could be missed for various reasons, including the possibility that the operation started after the census list was developed, the operation was so small as not to appear in any agriculture-related source lists, or the operation was erroneously classified as a nonfarm prior to mailout.

The remaining three types of coverage error were measured by the Classification Error Survey. This survey was used to estimate the number of farms counted more than once (DUP), the number of farms misclassified as nonfarms (ICU), and the number of nonfarms misclassified as farms (ICO). A sample of census of agriculture respondents was selected for re-interview to determine their farm/nonfarm status and collect information to identify potential duplication.

Based on the coverage estimation, the adjusted census total, T, was estimated as the census farm count, C, plus undercount and minus overcount adjustments. Undercount includes 1) farms not on the census list (NML) and 2) farms incorrectly classified as nonfarms (ICU). Overcount includes 3) nonfarms incorrectly classified as farms (ICO) and 4) farms duplicated in the census (DUP). Altogether, the adjusted census total is: $T = C + (NML + ICU) - (ICO + DUP)$. In some states, estimates of misclassification of farms owned by operators having rare demographic characteristics were based on particularly small sample sizes. Where such small sample sizes occurred, a form of small area estimation was used in which data from similar states contributed to that state's estimates. In these cases, the coverage totals are weighted totals of the direct state estimate and the direct estimate from the region. Direct estimates were used to the largest extent possible, based on the amount of survey cases available for the particular item being estimated.

Additional detail about the 1997 census nonresponse, reliability, and coverage are included in Appendix C of the 1997 Census of Agriculture, Volume 1 publication. Net coverage error, defined as the difference between undercounted and overcounted farms, is included in the Highlights Table of the 1997 Volume 1 publication.

2002 COVERAGE ASSESSMENT

Overview

The primary objectives of the census of agriculture were to provide county-level data on the number of farms, their economic and demographic characteristics, and their size, type, and structure. According to 2002 census coverage evaluation results, the census before coverage adjustment included 89.0 percent of U.S. farms and 95.8 percent of agriculture production (sales). Complete enumeration of agricultural operations satisfying the farm definition of \$1,000 or more in agricultural sales is a virtually impossible task made even more complicated by the variety of arrangements under which farms are operated, the multiplicity of names used for an operation, the number of operations in which an operator participates, and the difficulty in classifying those operations just around the \$1,000 sales range. Extensive efforts were made to compile as complete and accurate a list frame as possible, while reducing the duplication and number of non farm operations on the list.

Major components of the 2002 Census of Agriculture coverage program included, but were not limited to:

- Extensive efforts to build and update an accurate list of farms and ranches, including the screening of approximately 600,000 potential farms via a Farm Identification Survey (FIS) during the census year, checks to detect and remove duplication both within states and across states, and measures to improve name and address quality;
- Use of deterministic imputation;
- Statistical estimation procedures to account for whole farm nonresponse and sample data collection;

- Efforts and procedures to minimize respondent, enumerator, and processing error;
- Measuring and adjusting for mail list undercoverage;
- Conducting a classification error study (CES).

Census Mail List and Screener Phase

The National Agricultural Statistics Service (NASS) maintains a list of farmers and ranchers from which the Census Mail List (CML) was compiled. The goal was to build as complete a list as possible of agricultural places that produce and sell, or would normally sell, \$1,000 or more of agricultural products per year. This was the same list used to define sampling populations for NASS surveys conducted for the agricultural estimates program. Each record on the list includes name, address, and telephone number plus additional information used to efficiently sample and administer the NASS census of agriculture and its agricultural estimates programs.

NASS builds and improves the list on an ongoing basis by obtaining outside source lists. Sources include state and federal government lists, producer association lists, seed grower lists, pesticide applicator lists, veterinarian lists, marketing association lists, and a variety of other agriculture-related lists. NASS occasionally obtains special commodity lists to address specific list deficiencies. In 2000, NASS began an intensive push to increase list coverage in preparation for the census.

Beginning in April 2002, NASS conducted the 2002 Farm Identification Survey to screen approximately 600,000 potential farms before placing them on the CML. These records were mailed a one-page report form and a nonresponse followup mailing was made in May 2002. A second mailing to a group of about 570,000 additional potential farm records was conducted in mid-July 2002. There was no followup mailing. Places qualifying as farms [in-scope (I/S)] were added to the CML, and farms confirmed as out-of-scope (O/S) were dropped from the list. Names with addresses that were returned as Undeliverable-As-Addressed (UAA) were excluded from further census mailings. In addition, names that did not respond were mailed census report forms although they were not added to the CML as active farms.

During the spring and summer of 2002, measures were taken to improve name and address quality. Checks were made to detect and remove duplication both within states and across states. List addresses were processed through the National Change of Address registry and the Locatable Address Conversion System to ensure they were correct and complete. Records on the mail list with missing or invalid phone numbers were matched against a nationally available telephone database to obtain as many phone numbers as possible.

The official CML was established on September 1, 2002. The list contained approximately 2.84 million records; about 1.8 million records were thought to meet the census definition of a farm and just over 1.0 million were thought to be potential farms.

Census Sample Design

All name and address records on the final CML received a 2002 Census of Agriculture report form. Two different types of census report forms, sample and nonsample, were used to collect data. Sections 1 through 16 and 22 through 25 of the sample form were identical to sections on the nonsample census form. Sections 17 through 21 of the sample form contained additional questions on usage of fertilizers and chemicals, farm production expenditures, value of machinery and equipment, value of land and buildings, and hired workers.

The sample form was mailed to all mail list records in Alaska and Rhode Island and to a sample of records in other states. Mail list records were selected into the sample with certainty if they:

- Were expected to have large total value of agricultural products sold or large acreage;
- Were in a county with less than 100 farms in 1997;
- Had other special characteristics, (e.g., institutional farms, experimental and research farms, Indian reservations, etc.).

The regional report form versions and the sampling scheme were used to provide reliable data for a large number of items/commodities at the county level, while reducing response burden.

Editing Data and Imputing for Item Nonresponse

The mailing label on all forms returned to the National Processing Center (NPC) were scanned using bar code readers to capture identifiers and for check-in purposes. Forms determined to represent qualifying, in-scope farms were submitted for imaging. A snapshot was taken of each page of every report form and Optical Mark Recognition (OMR) and Intelligent Character Recognition (ICR) techniques were used to capture reported data from the images. The ICR engine determined a confidence level for every cell read. Any cell with a confidence level below a prescribed value was referred to analysts to review and correct from the image, when necessary. The images and the captured data were transferred to NASS on a flow basis. Data collected by telephone were captured using computer-assisted telephone interview software.

Captured data were processed through a format program. This program verified that record identifiers were valid and checked the basic integrity of the data fields. Rejected records were referred to analysts for resolution.

All 2002 census data were passed through a complex computer edit. Data were batched by state for submission to the computer edit. The edit determined whether a reporting operation met the minimum criteria to be counted as a farm in the census. Operations failing to meet the minimum criteria were referred to analysts for verification. The edit examined each report for reasonableness and completeness and determined whether to accept, delete, impute (supply), or alter the reported value for each data item.

Whenever possible, imputations, deletions, and changes made by the editing system were based on related data on the respondent's report form. For some items, such as operator characteristics, available data for that farm from the previous census were used. Values reported on previous NASS surveys were also used where applicable.

When these and similar methods were not available and values had to be supplied, the imputation process used information reported for another farm operation with similar characteristics and in the same locality.

To maintain consistency with the complex edit, the imputed values in most sections of the report were tested to ensure they satisfied critical relationships among items within the section. All records with data changes were resubmitted to the edit to verify that acceptable corrections were made.

Nonresponse and Sample Estimation

Statistical estimation procedures were used to account for whole farm nonresponse and sample data collection. Statistical estimates for sample form-only data items had to be calculated since, by design, the data were not

collected from every farm. Nonresponse and sample estimation procedures were not applied in Alaska and Rhode Island because all farms received the sample form and data were collected from all farms.

Treatment of Farms Selected for the Screener Phase. The screener phase and followup strategies resulted in several possible outcomes depending on whether the screener name responded and was in or out of scope. Each of these outcomes was handled differently to adjust for nonresponse.

Names responding to the screener as out of scope (nonfarms) were excluded from the CML. If the respondent answered the screener as in scope, the respondent was added to the CML and received a census form. If this in-scope screener respondent answered the census form, the operation's report was eligible to be used to help account for nonrespondents to the census. If the in-scope screener respondent failed to respond to the census form, that operation's data were accounted for by census respondents.

Records for operations that did not respond to any of the three screener mailings were not considered to be part of the CML, but they were sent a census form. Screener nonrespondents that responded as in-scope operations on the census were assigned a fixed nonresponse weight of 1 for census tabulations. Screener nonrespondents that failed to respond to the census form were treated in summarization as if they never existed on a mail list.

Whole Farm Nonresponse Estimation. Whole farm nonresponse to the census occurred when no data were received from an operation on the CML. Records deemed to represent either a large farm, as defined by the total value of production or acreage, or a unique type of farming operation received intensive telephone or personal followup during census processing to obtain a response. If these attempts failed, data were imputed for the record. These large and/or unique records were designated as "Must" records and were assigned a fixed nonresponse weight of 1, meaning their data were not used for nonresponse adjustment.

During mail list development, the field offices, in an effort to reduce respondent burden, identified operations that participated in multiple NASS surveys, and those that had special reporting relationships with an enumerator. These records also had a nonresponse weight of 1, and the reports were not used for nonresponse adjustments.

Whole farm nonresponse that occurred within the remaining universe of records, called non-Musts, was accounted for by a statistical weighting procedure. All responding non-Musts in a State were put into mutually exclusive weighting groups based on their size and county as recorded on the CML database. Statistical models were used to estimate the number of nonresponse farms that were in scope for each weighting group. The weights of the responding farms in each weighting group were increased to account for nonresponding farms in that group.

Throughout the data collection period, changes and additions were made to the CML. Records added after the initial CML was created on September 1, 2002 were designated as new adds, treated like screener nonrespondents – screener nonrespondents that responded to the census as I/S were subsequently subtracted from the measurement of undercoverage – and given a nonresponse weight of 1. New adds responding as in-scope records to the census were subsequently subtracted from the measurement of undercoverage. New adds linked to operations originally on the CML were not considered new adds. New adds occurred any time after the CML creation and before final weighting.

Some operators were sent more than one census form. These operators were required to fill out a separate form for each operation. Also, an operator may have had an additional operation for which a census form was not received, but the existence of which was noted on the form of the known operation. That operator was sent a new census form or enumerated by telephone to obtain data for that previously unknown operation. The

nonresponse weight for the new record was set equal to the nonresponse weight for the original operation reporting its existence.

Some large farms operating in more than one county were treated as distinct county-specific operations to more accurately allocate data to counties. Similarly, large farms operating in more than one State were treated as distinct state-specific operations. “Split add” records were created for these operations – data was obtained and distributed appropriately – and they were assigned the same nonresponse weight as the original CML operation. Controls ensured the calculated and nonresponse weights never exceeded 2. The nonresponse weights were systematically rounded to integers and an integerized weight of either 1 or 2 was assigned to each record. The integerization process eliminated any impact rounding would have had on census farm counts and totals in each county and in cross tabulations.

Sample Estimation. All Must records were preselected to receive the census sample form. Non-Must records were sampled to determine which would receive the sample form and which the nonsample form. All records in some small counties automatically received the census sample form but these records were not necessarily Must records. Nonresponse adjustment was allowed for the non-Musts.

Weights applied to the sample items appearing on the sample form only (Sections 17 through 21) were calculated by multiplying the farm’s coverage-adjusted weight, which is described later, by the sample factor (e.g, 6 for a farm sampled with a 1-in-6 rate, 1 for a Must). An additional adjustment was then made to ensure that the number of farms operating in a county as estimated from the sample matched the number estimated from the full census. Before computing published tabulations based on the sample, each record’s sample weight was integerized to eliminate the impact rounding would have had on census farm counts and totals.

Operators with more than one operation were sampled as one record and received the same census form for each operation. Operations added after sampling were treated differently depending on whether or not the record was linked to a record on the original CML. Added operations that linked to a record on the original CML were mailed the same census form as the original CML operation. Added operations that were not linked to a record on the original CML were mailed the sample form.

Measurable Census Error

The root mean squared error of an estimated data item measures the variation in the value of that item based on all possible outcomes of the census collection, including variants as to who was on the census list, who returned a census form and who was selected to fill out the sample form.

Data items were classified as either complete count items or sample count items. Sample count items were collected only on the sample version of the census report form. Complete count items were collected from all respondents. Variability in the estimates of complete count items was due only to the nonresponse and coverage estimation adjustment procedures. Variability in the estimates of sample count items was due to both the adjustment procedures and the census sample selection and estimation procedure. Therefore, variability in the sample count item estimates tends to be larger than the variability in the complete count item estimates.

Nonsampling error due to mail list incompleteness and duplication as well as misclassification of records on the mail list was referred to as coverage error. The section titled “Classification Error Study” addresses attempts to assess, at least qualitatively, the impact of classification error on the census results.

Nonmeasurable Census Error

The accuracy of the census counts is affected jointly by measurable errors and by nonmeasurable errors. Extensive efforts were made to compile a complete and accurate mail list for the census, to design an understandable report form with instructions, and to minimize processing errors through the use of quality control measures. Despite these efforts, nonmeasurable errors are inevitable and arise from many sources, including respondent or enumerator error, incorrect data capture, editing, and imputing for missing data. These errors are discussed in this section.

Respondent and Enumerator Error. Incorrect or incomplete responses to the census report form or to the questions posed by an enumerator can introduce error into the census data. To reduce reporting error, detailed instructions for completing the report form were provided to each respondent. Questions were phrased as clearly as possible based on previous tests of the report form. Computer-assisted telephone interviewing software included immediate integrity checks of recorded responses so suspect data could be verified or corrected. In addition, each respondent's answers were checked for completeness and consistency by the complex edit and imputation system.

Item Nonresponse. As information flowed from data collection to tabulation, various types of item nonresponses were identified on the census report forms. Nonresponse to particular questions on the form that logically should have been present created a type of nonsampling error in both complete count and sample count data. In this case, information from a similar farm was used to impute for these missing data items. The resulting data may have been biased if the characteristics of the nonreporting farms were different from those of reporting farms for those items.

Processing Error. All phases of processing for each census report form were potential sources of nonsampling error. An automated check-in procedure recorded that the report had been returned and excluded it from further followup mailings. Approximately one-third of the mail returns were reviewed to resolve questions dealing with multiple reports, respondent remarks, or no reported data. The remaining mail returns (about two-thirds), along with some of the reviewed cases containing farm data, were sent directly to imaging and data capture. Data were transmitted, formatted, and run through the complex edit and imputation system to ensure within record consistency. About 700,000 report forms were clerically reviewed for inconsistencies, omissions, or questionable values.

While reviewing these forms, staff determined if the action taken by the computer edit and imputation system was correct. Additional analysis tools were used to examine data across records for distributional irregularities and extreme values. Edited records were tabulated to the county level. Each county was reviewed and, when necessary, individual records were corrected prior to publication. During data collection and processing of the census, all operations underwent a number of quality control checks to ensure results were as accurate as possible.

Coverage Adjustment

Although much effort was expended making the CML as complete as possible, the coverage of farms was not complete. NASS's goal was to produce agricultural census totals for publication that were fully adjusted for list undercoverage at the county level. Estimates of the undercoverage for a specified set of farm characteristics, called calibration variables, were computed using an area-frame sample. Initial weights were assigned to census respondents to account for nonresponse. These weights were further adjusted to compensate for estimated State-level undercoverage for each of the calibration variables based on the area frame sample. Every

farm with census data was assigned a fully-adjusted weight by this process. This allowed county-level totals that were generated for every census variable, not just the calibration variables. The section titled “Calibration Algorithm” provides a list of the area frame based calibration variables.

To further improve coverage adjustment, a second set of targets and ranges were added to the calibration effort. These were well established commodity totals for which excellent check data were available for validation. The introduction of these commodity targets strengthened the overall coverage adjustment process, limiting the possible adjustments produced by the area frame based targets by ensuring major commodity totals remained within reasonable bounds of established benchmarks.

Most targets were determined at the state level. The one exception was the New England states – Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont – which were combined into one “calibration region.” In what follows, “state” refers to the calibration region for New England. Coverage adjustments were not made in Alaska and Hawaii.

Measuring Mail List Undercoverage. Census mail list undercoverage was measured using an independent survey of land segments selected from the NASS area frame. The NASS area frame covers all land in the U.S. and includes all farms.

Each June, NASS conducts a survey that enumerates area frame segments for agricultural activity. The sampled segments are allocated to provide accurate measures of acres planted to widely grown crops and inventories of hogs and cattle. The 2002 June Agricultural Survey (JAS) was supplemented with the 2002 Agricultural Coverage Evaluation Survey (ACES) to better estimate CML incompleteness. The ACES used a sample of segments allocated in a way that, when pooled with the JAS, ensured accurate measures of number of farms and land utilization could be obtained. Enumerators visited all segments, identified all farms operating land in each segment, and obtained basic data about those farms. The June Agricultural survey consisted of approximately 11,000 segments and ACES 2,400 segments. Data collection occurred between May 30 and July 25, 2002.

The names and addresses collected in the 2002 JAS and 2002 ACES were matched to the census mail list. Farms that did not match were re-contacted after the census mailout to confirm that they did not receive a census form. Farms that had not received a census form represented the farms not on the mail list (NML). Those who received a census form had been erroneously classified as NML and were removed.

The percentage of farms missed in the census varied considerably by state. In general, farms not on the mail list tended to be small in acreage, production, and sales of agricultural products. Farm operations were missed for various reasons, including the possibility that the operation started after the mail list was developed, the operation was so small as not to appear in any agriculture-related source lists, or the operation was falsely classified as a nonfarm prior to mailout.

The national NML estimate for the number of farms was used in determining calibration targets (CML + NML). State-level farm-count estimates based on the NML sometimes had unacceptably high standard errors, as well as apparent systematic biases. These estimates were smoothed across states based on separate NASS surveys and previous analysis.

Calibration Algorithm. Coverage adjusted weights were obtained by an algorithm based on the restricted regression algorithm referred to by Singh and Mohl (1996) as the Linear Truncated Method. Coverage adjustments began with the nonresponse weights before integerization. The final coverage-adjusted weights were restricted to the interval [1,6].

Calibration variables were based on:

- Total market value of agricultural products sold and government payment;
- Age of principal operator;
- Sex of principal operator;
- Race of principal operator (selected categories);
- Principal operators of Spanish, Hispanic, or Latino origin;
- Number of farms and land in farms;
- Number of extreme operations (very large or unusual farms);
- Selected types of farms by commodity produced;
- Various commodity acreage and production statistics (varies by state).

Integerization and Sample Weights. Coverage-adjusted weights were integerized to eliminate the need for rounding estimated counts computed with coverage-adjusted weights. The integerization process minimized county-level impact on the nonresponse and coverage adjustment of number of farms and total land in farms.

Sample weights were computed by multiplying coverage-adjusted weights before integerization with the appropriate sampling factors and adjusting the results to add up to matched census counts as described previously. Sample weights were then integerized.

CLASSIFICATION ERROR STUDY

Overview

The 2002 Classification Error Study (CES) was conducted for the conterminous U.S. to study the potential impact of classification error on the census results. The study used data from the 2002 June Agricultural Survey (JAS) and the 2002 Agricultural Coverage Evaluation Survey to examine farms:

- Incorrectly classified as nonfarms (undercount);
- Nonfarms incorrectly classified as farms (overcount);
- Duplication of farms (overcount).

The CES was not intended to adjust census farm counts, but rather, to evaluate procedures and to identify potential improvements in list building, data collection, and other activities in preparation for future censuses.

For the evaluation, additional name, address, and telephone information were collected on both the JAS and ACES by adding the following three questions:

- (1) During the past two years, has the operator received mail for this operation at any address other than the one shown on the face page?

- (2) Excluding partners and landlords, were any other names associated with this operation in the past two years? (For example, other business names, spouses names, etc).
- (3) Is any of the land inside the blue tract boundary rented from others? (Include land for which you paid cash rent, land used rent free, or land rented on shares).

The Process

The CES consisted of a two phase review process. The initial phase, Review of Possible Matches, used Probabilistic Record Linkage (PRL) to match the additional information collected on the area surveys to the name and addresses on the 2002 Census Mail List (CML) including late adds. PRL is a technique used to identify records that are believed to correspond to a CML record. Records were brought together into link groups, with each link group consisting of all records that possibly represented the same operation. Each link group was classified into one of three distinct types: matches, possible matches and nonmatches. The nonmatches were represented in estimation as part of the undercoverage measure. The CES was primarily concerned with the matches and possible matches. Each field office reviewed the possible matches and determined match or nonmatch status.

Upon completion of the PRL review, the field offices conducted a Farm Classification Resolution review of two additional sets of records. The first of these was comprised of area records matching two or more census records. Reviewing these records helped identify duplication on the CML. The second set consisted of groups of records (area and census) within which the reported acreage differed by more than 25 percent. Analysts reviewed the cases in the second phase. Upon completion of both phases, data were compiled to estimate undercount, overcount and duplication.

Findings and Results

Characteristics of Undercounted farms. Undercounted tracts are those where they are out-of-scope on the census, while the area frame shows these as having some valid data reported for them (agricultural tracts). There were 2,063 undercounted tracts which expanded to 157,183 farms, an average of 76 farms per tract. More than 90 percent these farms consisted of one-to-one matches during the review process. This indicates that there was a high level of agreement between the fields (name, address, SSN, EIN, etc) put through for matching.

The distribution of farms by current status code shows that 50 percent of the farms undercounted were from the 'Other' type of out-of-scope records. Another 25 percent of the records were either computer or data review out-of-scoped. It is important to note that if these records had not changed status they would have been matched correctly to their respective area records. Additionally, 10 percent of the farms were landlord only operations.

Undercount of farms occurred mostly for cattle and calves (27.0 percent), grains/hay (28.9 percent), and horses and ponies (29.3 percent).

The percentage of undercounted farms decreases with increasing TVP. Records with no TVP and point farms (\$1-\$999) comprised roughly over 50 percent of the undercounted farms. Large farm operations (\$250,000 or more) comprised only 2 percent of the undercount. It is important to keep in mind that smaller operations are more likely to go out of business in a shorter period of time than are larger farm arrangements.

Close to 70 percent of the farms undercounted were operations other than a farm or ranch and 92 percent were individual or family type arrangements.

Characteristics of Overcounted Farms. Overcounted tracts consisted of a non-agricultural tract matching a census in-scope. There were 1842 tracts overcounted. The expanded number of overcounted farms was 97,375, an average of 33.7 farms per tract. It is important to note that non-agricultural tracts did not have any data reported for them. In hindsight, the only data available were those collected for the in-scope census records the on-agricultural tracts matched. Thus, these were the data used for the summaries provided in this report. Of the total overcount estimate, 74.9 percent came from matching to a census in-scope record. The remaining 25.1 percent were non-ag tracts matching to census non-respondents. These matches were considered valid matches since we account for non-respondents through the non-response adjustment. The only available acreage data for the non-respondents was control data for 2001 or earlier. Data were not always reported for all items on the census, thus in some instances the percentages provided are based on valid reports.

For the type of farm category, there were 59.5 percent of data reported. From this total, 37.6 percent of the farms overcounted were cattle and calves and 25.2 percent were other crops and hay. The remaining types of farms comprised 37.2 percent of the reported fields for this item. This indicates that we missed specialty farms in small percentages.

For the total of value of production category, the results are based on 50.1 percent of valid reports. Operations where TVP was less than \$5,000 made up over 59 percent of the valid reports for misclassification overcount. Large arrangements (TVP \geq \$100,000) comprised 3.9 percent of all farms overcounted. Of the valid reports for misclassification overcount, 32.9 percent of the operations missed for this type of error were farm or ranch type operations.

Characteristics of Duplicated Farms. Duplicated tracts consisted of an agricultural tract matching two or more census in-scope records or a non-agricultural tract matching two or more out-of-scope records. There were 620 duplicated tracts which expanded to 17,827 duplicated farms. This was an average of 29 farms per tract. The vast majority of the duplication was attributed to an agricultural tract matching several census in-scope records—98.5 percent. The remaining 1.5 percent duplication was due to a non-agricultural tract matching to several non-respondent census records.

As was expected, the majority of the misclassification duplication occurred for cattle and calves (26.8), grain and oilseeds 25.5 percent), and other crops and hay (11.0 percent).

Only 4 percent of the farms duplicated had no TVP or TVP was less than \$1,000. On the other hand, 36 percent of the farms duplicated were large arrangements with TVP \geq \$100,000.

On all farms duplicated, 72.6 percent were a farm or ranch type operations. And, 42.6 percent were partnerships. The findings go along with expectations that partnerships are more likely to be duplicated since they have higher chances to mail in multiple reports.

National Level Results. The CES looked at three types of errors: undercount (area tracts considered out-of-scope in the census); overcount (non-ag tracts considered in-scope on the census); and duplication (ag tracts matching two or more census records). There were 4,525 tracts in the scope of the CES. Of these, 2,063 were undercounted tracts, 1,842 overcounted, and 620 duplicated.

The U.S. net misclassification error was calculated as:

Undercounted farms - Overcounted farms - Duplicated farms

The results show that there was a net misclassification undercount of 41,980 farms and an undercount of small farm operations (TVP less than \$2,499). Results also indicated there was an overcount of large farms (TVP

greater than \$100,000). One reason to explain this is that larger operations are more likely to be either managed or in a partnership, thus increasing the likelihood that multiple reports were mailed back. Additionally, it is expected that the misclassification undercount occurred for small operations since these are more likely to go in and out of business. Small operations are also very difficult and expensive to locate during list building activities. Thus, these operations were in business at the time of the area frame data collection, but became out of scope during the time of the Census data collection (a year later). It is important to note that the results shown for the overcount were obtained directly from the Census in-scope records since there was minimal information for the non-ag tracts. For overcounted and undercounted farms, the total number of operations decreased as TVP increased

Of the 48 states participating in this study, 32 showed non-significant misclassification net error whether undercount, overcount, or duplication misclassification had occurred. Alabama, Arkansas, Colorado, Idaho, Michigan, Nevada, New Hampshire, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Vermont, and Virginia showed statistically significant misclassification net error. Alabama and Arkansas showed an overall overcount of farms, while the remaining 14 states showed a net misclassification undercount of farm operations.

1997 AND 2002 ELEVEN STATE COMPARISON

In 1997, the CES was conducted for the 11 Western states which comprise the West Census Region. The states participating in the 1997 study were Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The 2002 CES found a net misclassification undercount estimate of 16,891 farms as aggregated for these eleven states (after taking into account the duplication and overcount portions). This estimate was lower than the net 27,971 misclassified undercounted farms as reported for the 1997 study. There were 22,121 farms misclassified undercounted in 1997 and 32,599 in 2002. A correctable positive bias existed in the area frame estimators due to the lack of data for the non-ag tracts for which only the available census reported data were used.

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INTRODUCTION

Historical Background

The U.S. Department of Commerce, Census Bureau carried out the first agricultural census of Puerto Rico as part of the 1910 decennial census program, and the Commonwealth continued to be covered in the decennial agriculture censuses from 1910 through 1950. The Puerto Rico Reconstruction Administration conducted a special census of agriculture in the Commonwealth in 1935, but this was a local effort. Congress modified the schedule of the agriculture censuses in 1952, requiring that they be conducted every 5 years for years ending in "4" and "9." The legislation changing the dates of the censuses did not include Puerto Rico in the program, but the 1959 agriculture census in the Commonwealth collected data for the 1958-1959 crop year, and the data were published as part of the 1959 census publication program. Thereafter, Puerto Rico remained part of the regular quinquennial agricultural enumeration.

In 1972 Congress changed the census schedule once again, directing that the agriculture and economic censuses be conducted for the same reference periods, and authorizing the Census Bureau to shorten the intercensal intervals between the 1974 and the two subsequent agricultural censuses by 1 year so that the census schedules converged by 1982 with a minimum disruption of census work. Following the 1977 Economic Censuses, however, the Census Bureau advanced the date of the agricultural enumeration in Puerto Rico by a full year to take advantage of the offices and office staff organized for the economic program. The agency repeated this arrangement for the following agricultural census, although the alteration of the schedule for the census in the 50 states meant that the Puerto Rico enumeration began just as the stateside census completed data collection.

For the 1987 and 1992 censuses, the Census Bureau assigned the Agriculture Division responsibility for both the agricultural and the economic censuses in Puerto Rico. This enabled the agency to take advantage of some economies of scope created by combining control of the censuses in one area. The field office supervised census operations within the Commonwealth, including the field enumeration of area sample farms, and field and telephone follow-up of nonresponse cases. However, this practice changed for the 1998 census. By virtue of the 1997 Appropriations Act, the responsibility for conducting the census of agriculture was transferred from the Commerce Department, Bureau of the Census, to the U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS). Thus, the 1998 Census of Agriculture for Puerto Rico was the first census conducted by NASS.

The 2002 Census of Agriculture for Puerto Rico was taken at the same time the Nation's census was conducted. Therefore, another change was necessary, collecting the census data for Puerto Rico on a calendar year, rather than on a crop year, as in past censuses.

Legal Authority and Special Agreement

The census of agriculture is required by law under the "Census of Agriculture Act of 1997," Public Law 105-113 (Title 7, United States Code, Section 2204g). The law directs the Secretary of Agriculture to conduct a census of agriculture in 1997 and in every fifth year thereafter, covering the prior year. The census of agriculture includes each state, Puerto Rico, Guam, the U.S. Virgin Islands, and the Commonwealth of Northern Mariana Islands.

The census data for Puerto Rico were collected in accordance with a Memorandum of Understanding signed by NASS's Administrator and the Puerto Rico Planning Board's President. In addition, two cooperative agreements were signed with the Puerto Rico Department of Agriculture and the University of Puerto Rico who shouldered the bulk of the field enumeration.

Farm Definition

The farm definition for the 2002 Census of Agriculture for Puerto Rico was based on value of sales of agricultural products during the reference period. A place qualified as a farm, for census purposes, if it had, or normally could be expected to have, \$500 or more in sales of agricultural products in the 12 months preceding January 1, 2003.

Census Methodology

The 2002 Census of Agriculture for Puerto Rico was conducted using a multiple frame approach, consisting of a list frame and an area frame. The list frame was comprised of a list of all known operators. The list was compiled prior to the census, using the list of active farms from the 1998 Census of Agriculture, lists of farmers from the Puerto Rico Department of Agriculture, plus names and addresses of farm operations identified through a screening of the area frame. Duplicate records, where an operation was included on more than one list, were identified and removed and a final list was developed with the goal of having every active farm operation included. Every address on the list, except for some special records which were enumerated person to person, was mailed a census report form. Those that did not respond to this first report form received a second report form through the mail. Enumerators from the Department of Agriculture and the Extension Service visited operations that did not respond by the mail.

Scope and Content

The basis of the agriculture census was the individual operating unit, usually the individual farm. The census requested data on land, cuerdas¹, and land use; crops, cuerdas harvested, and production; irrigation, cuerdas irrigated, type of equipment used, and major source of water; livestock, poultry, aquaculture, and other animal specialties; total value of sales (crops, livestock, and aquaculture); farm-related income; type of organization; operator characteristics; fertilizers and agricultural chemicals used; production expenses; machinery and equipment; and hired workers, agregados, and sharecroppers.

Reference Periods and Dates

The census requested land, land use, production, expenditure, farm labor, and sales data for the 12 months between January 1, 2002 and December 31, 2002. Data on inventory (livestock, poultry, and hogs), machinery and equipment, buildings and facilities, and number of sharecropper and agregado families were requested as of December 31, 2002.

Data Collection

The bulk of the data for the 2002 Census of Agriculture for Puerto Rico was collected by mail. NASS assembled a mailing list from farms that had reported in the 1998 census, as well as lists of farm operations provided by the Government and the private sector in Puerto Rico and names and addresses identified by an area frame screening. Report forms were mailed to approximately 20,000 addresses in December 2002. The initial mailout was followed by a reminder postcard sent to all addresses on the initial list, and by a mail follow-up to the nonrespondents. Staff from the USDA's Cooperative State Research, Education, and Extension Service and from the Office of Statistics at the Puerto Rico Department of Agriculture telephoned or visited those operations that did not respond by mail.

¹ A cuerda equals approximately 0.97 acres.

PLANNING

General Plans

Planning for the 2002 Census of Agriculture for Puerto Rico began in 2000, when all name and address records generated from the 1998 census were converted to Enhanced List Maintenance Operation software, the NASS software for list frame development. In the same year, the Field Office began operating in Santurce, Puerto Rico through an agreement signed between the Puerto Rico Department of Agriculture and NASS. Memorandums of Understanding, previously signed by NASS, the Puerto Rico Planning Board, the University of Puerto Rico, and the Puerto Rico Department of Agriculture were revised prior to the enumeration. The Puerto Rico Government activated the interagency planning committee to consult with NASS. By December 2001, NASS had proposed the final content for the Puerto Rico report form and developed plans for using a combination of list and area frame enumeration.

Interagency Working Group

The Government of Puerto Rico organized an informal committee composed of representatives of various agencies concerned with the 2002 Census of Agriculture for Puerto Rico. Offices and agencies represented on the committee were:

- Puerto Rico Planning Board
- Puerto Rico Department of Agriculture
- Puerto Rico, Asociacion De Agricultores (Farm Bureau)
- University of Puerto Rico Cooperative State, Research, Education, and Extension Service
- University of Puerto Rico College of Agricultural Sciences
- Puerto Rico Rural Development Corporation
- Puerto Rico Farm Service Agency
- Puerto Rico Department of Education
- Puerto Rico Farm Credit
- National Agricultural Statistics Service

Beginning in February 2001, NASS officials met with member agency and office representatives periodically and communicated with them on a continuing basis to discuss plans for report form content and enumeration methodology.

PREPARATORY OPERATIONS

Report Form Design

The Census Program Administration Section of the Census and Surveys Division, with the cooperation of the Puerto Rico Planning Board, designed a single report form for the agriculture census in Puerto Rico. The report form was an 8-1/2" x 11" 16-page booklet printed on white stock with green shading and black text. The standard version was in the Spanish language; an English-language reference version also was prepared for office use.

Based on feedback from data users in Puerto Rico, the following changes were made to the 2002 report form:

- Added hydroponic crops to vegetables and melons section;
- Added palm trees and poinsettias to the horticultural specialty section;

- Added cost of machinery and building maintenance to the production expenses section; and
- Added greenhouses to the machinery, equipment, and buildings section.

The final report form version consisted of twenty-six sections and asked for data on:

- Cuerdas owned, rented, or used in 2002;
- Agricultural products (including sugarcane, coffee, fruits, grains, root crops or tubers, vegetables or melons, lawn grass or ornamental plants, and grasses) harvested and products sold;
- Farm related income;
- Hired farm workers;
- Value of land and buildings;
- Irrigation;
- Land use;
- Aquaculture products for sale;
- Livestock and poultry inventory and sales;
- Farm related income;
- Farm organization;
- Characteristics and occupation of operator;
- Agricultural chemicals used;
- Production expenses;
- Machinery, equipment, buildings, and facilities on farms;
- Number of agregado and sharecropper families on farms.

List Frame Development

The mailing list for the 2002 Census of Agriculture for Puerto Rico was compiled prior to the census using the list of active farms from the 1998 census, the list of farmers from the Puerto Rico Department of Agriculture, and names and addresses of farm operations identified through a screening of the area frame. Duplicate records were identified and removed from the list.

Sample Design and Selection

In addition to mailing report forms to all farm operations on the census list, the agriculture census in Puerto Rico used an area frame sample to collect data and develop statistical estimates of agricultural operations at the

municipio and Island levels. The purpose of the area sample was to account for farms not on the census list and farms not responding to the initial census data collection efforts.

Within each municipio, land was classified into five different strata based on land use or the amount of agricultural activity present. The strata were defined as:

- Land areas with dense agriculture;
- Sparse agriculture with few houses;
- Sparse agriculture with many houses;
- Cities with no agricultural activity;
- Areas with no agriculture (such as parks and military installations).

Within each stratum, land was subdivided into Primary Sampling Units (PSU). PSU boundaries were set on permanent physical features like roads and rivers whenever possible. These PSUs were the basic sampling unit for the area frame sample.

Municipios were grouped together to form clusters based on agricultural similarity. Municipios with a large number of cuerdas of coffee in the previous census formed a cluster, as did municipios with large numbers of cattle and areas of pasture. A stratified random sample of PSUs was chosen within each cluster. The selected PSUs were then broken down into the final sampling unit, called segments. One segment was chosen at random from each sampled PSU. Segment boundaries were also set on physical features to aid in locating boundaries by the field enumerators. The segment sizes varied across the different strata, ranging from 0.10 square miles in city areas to 0.50 square miles in the highly agricultural areas. Sampling rates varied across strata within each cluster with more samples being allocated to areas with agricultural activity. Sampling for the non-agricultural stratum was carried out at the Island level. A total of 300 segments were selected for enumeration. Prior to the census, the area frame was screened by enumerators from the Department of Agriculture who identified all farm operators within each assigned area segment. They recorded the name, address, and cuerdas operated within the segment. Farm operations were then checked against the census mail list to avoid duplication. A total of 558 farm operators were found in the 300 sampled area segments which were not on the mail list and became the size of the sample for the 2002 census.

Printing and Addressing Report Forms

Private contractors printed the report forms, envelopes, instruction sheet, and transmittal letters and assembled the mailing packages before delivering them to the National Processing Center (NPC) in Jeffersonville, IN. The quantities of report forms and associated materials printed are shown in table 8-1.

Table 8-1. Report Forms, Envelopes, Letters, and Other Printed Enumeration Materials

Form	Description	Quantity
02-A1(PR)SP	Report form (Spanish)	40,000
02-A1(PR)L1	Transmittal letter (Sp\Eng)	20,000
02-A1(PR)SP(I)	Information sheet (Spanish)	40,000
02-A1(PR)L2	Follow-up postcard(Spanish)	22,300
02-A1(PR)L3	Follow-up letter (Sp/Eng)	17,300
02-A7.1(SP)	Initial mailout envelope	22,300
02-A7.2(SP)	Followup mailout envelope	17,300
02-A8A(SP)	Return envelope	40,000

NASS prepared an address label for each address on the list. Each label contained the printed address and a machine-readable barcode containing the address as well as size and farm-type codes for the addressee. The Puerto Rico Field Office provided the mail-address file to the NPC in the second week of November 2002. NPC used high-speed Printronix printers to print the address labels directly onto the report forms through the open window of the envelopes. Labeled mailing packages were packed in cartons (each containing approximately 125 mail packages) according to postal requirements for presorted mailings and sent for mailout.

Field Office Organization

The NASS Field Office in Santurce, in coordination with Headquarters staff, worked together with the local Extension Service and the Puerto Rico Department of Agriculture.

Areas of Responsibility

A toll-free telephone number was printed on the first page of the report form. The Puerto Rico Field Office and the Extension Service provided assistance to farmers requesting information or asking for help completing the census form.

The Field Office and the field enumeration staff conducted the enumeration of must records (operations that had to be enumerated because of their large size and value of production) which were not part of the mailout procedure. They also conducted the field follow-up, in coordination with the Extension Service, contacting and enumerating those who did not respond to the mail enumeration effort. The mail portion of the census began December 10, 2002. Field follow-up procedures continued through mid-May 2003.

Respondents to the mail census returned their completed report forms to NPC. The report forms were processed by the staff at NPC and an electronic file containing the captured data was transmitted to headquarters in Washington, DC. All census forms and the electronic data were then sent to the Field Office in Santurce for further analysis and storage.

Recruiting and Training

The agriculture census field staff was provided by the Puerto Rico Department of Agriculture and the University of Puerto Rico's Extension Service through a joint cooperative agreement with NASS. In June 2001, NASS conducted a training session for enumerators assigned to work on the pre-census area frame screening. The staff was provided municipio maps and aerial photographs to help them identify possible farm operations within the area frame. The field staff underwent further training during the week of December 1, 2002. NASS conducted three different training sessions covering enumeration procedures, coverage and quality control procedures, and administrative requirements.

Reference Materials

Headquarters staff prepared training and reference guides for use in the agriculture census in Puerto Rico. The principal reference materials used in the Field Office were the Enumerator's Manual and the Telephone Follow-up Guidelines. These documents covered basic administrative procedures for the area office, including local telephone follow-up operations and processing activities. Headquarters staff were responsible for training all personnel assigned to work on the census.

Members of the Puerto Rico Department of Agriculture, Office of Statistics, assigned to work on the census received a copy of the Enumerator's Manual as the primary reference for the field enumeration. They also were provided with the Telephone Follow-up Guidelines and a publicity package (see Publicity below). During the census, enumerators and office staff provided assistance to farmers who requested help through the use of the toll-free telephone number made available to them by NASS. During follow-up work, enumerators were provided a list of farms in the assigned municipios. The list included the names and addresses of farm operators who had been mailed a report form in the December mailout, but had not returned a report form. Enumerators visited the nonrespondents and completed a report form by personal interview.

AGRICULTURAL EXTENSION OFFICE SUPPORT

General Activities

The participation of the University of Puerto Rico's Extension Service (UPR-ES) in the 2002 Census of Agriculture was part of a cooperative agreement signed between NASS and the University of Puerto Rico. The UPR-ES functions in the same fashion as the U.S. Department of Agriculture's Extension Service, i.e., local offices assist farmers with information and advice on agricultural programs, problems, legal questions, and the like. The local offices have considerable knowledge of farming and farmers within their areas. They assisted NASS by:

- Providing its own list of farms for the census list frame compilation;
- Distributing publicity materials provided by NASS and promoting the enumeration among farmers in personal contacts;
- Providing help to farmers in completing the census report forms.

In addition, Extension Service (ES) agents were given a list of farms in their respective municipios that were mailed a report form in the December mailout, but no report form had been received. The agents visited the nonrespondents and completed a report form by personal interview or resolved the case in a consistent matter.

NASS conducted two 3-hour training sessions for ES agents during the first week of December 2002. Training was held at the Extension Service regional offices in Rio Piedras and Lajas. The training goal was to familiarize the agents with the census program and to prepare them to answer questions from farmers. Approximately 100 ES agents received training. Enumerator's Manuals and publicity packages were distributed to all trainees. Topics covered during the training included:

- An overview of the census;
- Data collection methodology;
- Role of the extension service agent in the census;
- Report form content.

Publicity

Census Planning Branch (CPB), Marketing and Information Services Office (MISO), and Puerto Rico Field Office staff cooperated in developing the publicity plan for the 2002 Puerto Rico Census of Agriculture. Major objectives of the publicity program were to:

- Encourage cooperation and prompt response by farmers to the census enumeration;
- Provide information to the public about the release of census data products.

Several items were developed specifically for the publicity effort in Puerto Rico. Printed materials included a poster, an agriculture census information packet, a newsletter article with general information about the census (including timing, data collected, uses of the data, and so on), and a series of press releases. The poster came in a large size (11" x 14") and announced the census. On December 1, 2002, 1,000 copies of the poster were distributed through local government offices and businesses for display in windows and on bulletin boards. The information packet contained:

- Mailout package transmittal letter;
- Frequently asked questions about the census, with answers;
- Puerto Rico report form and instruction sheet;
- Telephone contacts list;
- Newsletter article.

NASS assembled and shipped the information kits to the Puerto Rico Field Office for distribution to (and through) the Puerto Rico Planning Board, Department of Agriculture; local newspapers; the UPR-ES; and local colleges and agriculture-oriented organizations.

In addition, NASS asked the Governor of Puerto Rico to issue an official proclamation about the census. On November 20, 2002, the Governor signed a proclamation designating December 2002 "Agriculture Census Month" in the Commonwealth.

On December 5, 2002, the Puerto Rico Under Secretary of State, the Secretary of the Puerto Rico Department of Agriculture, the Vice-President of the Planning Board, the Chancellor of the University - Mayaguez Campus, and the Administrator of NASS participated in an official ceremony to read the signed proclamation and to kick off the 2002 Census of Agriculture.

DATA COLLECTION

On December 10, 2002, NASS mailed report forms to the approximately 22,000 addresses on its census list, asking operators to complete and return the forms within 21 days. The agency mailed a friendly reminder/thank you card to all addresses on the census list on December 30. Non-respondents received a second report form through the mail. Field staff telephoned or visited operations on the list that did not respond by mail. The overall enumeration achieved a 71 percent final response rate. An area frame was used to sample for coverage improvement. A total of 17,659 farms were counted for 2002.

DATA PROCESSING OVERVIEW

Data processing encompasses those activities associated with precomputer processing, computer processing including edit resolution, and data tabulation and review. The Census Bureau's National Processing Center (NPC) in Jeffersonville, IN, processed the report forms from the 2002 Puerto Rico Census of Agriculture. Field Office staff and staff from the Puerto Rico Department of Agriculture (PRDA) resolved edit problems.

During precomputer processing, completed forms were checked-in and problem cases or forms with attached correspondence reviewed. The NPC staff keyed the data from the report forms. In addition, data from several forms returned to the Puerto Rico Field Office were keyed by NASS staff using the Blaise System. The resulting computerized records were subjected to a detailed computer edit for consistency and reasonableness during computer processing. The edit identified erroneous or inconsistent data. In addition, written or extraneous marks on the report form were flagged for further analyst review.

Keyed data, all census report forms, and related correspondence were forwarded to headquarters in Washington, DC and later to Santurce, Puerto Rico, where NASS staff, with the assistance of personnel from the PRDA Office of Statistics, resolved problem records.

Before publication, NASS and PRDA statisticians reviewed the tabulations for inconsistencies and potential coverage problems. The 2002 totals were compared to previous census data, as well as other available information, and any problems were analyzed. When necessary, staff made corrections to the data records and retabulated the affected totals.

PRECOMPUTER PROCESSING

Receipt and Check-in

Returned mail cases were checked-in by optical scanning equipment that identified each report form by the bar code on the mailing label, while report forms completed by personal interview were checked in using assigned identification numbers keyed directly to the database. The first receipts arrived at the NPC office in January 2003 and continued on a flow basis until the last week of May 2003.

After check-in, report forms were routed to the batching control unit where control clerks batched the report forms into work units of up to 95 report forms using the Automated Tracking and Control System (ATAC). ATAC printed a Data Entry Batch Cover Sheet for each batch. At the same time the system accepted the batch,

it automatically updated the Person Operator Identification (POID) number tracking record to show that the report forms in the batch were now going to data entry.

Consistency and Coverage Review

Historical data from the 1998 census for Puerto Rico were made available to NASS for use in processing the census for the Commonwealth. Large cases preselected for review were identified by a specific processing sort code and were automatically sorted for review by analysts. During their review, analysts checked each form for internal inconsistencies, and matched the 2002 data for a specific record against the historical record to evaluate the reasonableness of any changes.

Data Entry

Data entry (or keying) involved capturing data from the census report forms to a machine-readable data file for edit and tabulation. The NPC's Data Services Branch used a key-to-disc interactive system that combined the clerical review of individual census report forms with the data entry operation. Quality control procedures included reviewing samples of each keyer's work and, when necessary, correcting keyer errors and retraining keyers.

COMPUTER PROCESSING

General Information

After data keying, data for each report form were subjected to a computerized edit. Analysts reviewed and verified any substantial changes generated by the computer edits to the data file prior to tabulation. The data were tabulated by municipio and for the Commonwealth, and NASS statisticians reviewed all tabulated totals to identify inconsistencies and potential coverage problems. The statisticians made corrections to the individual data records and the specific totals involved were retabulated. After disclosure analysis was completed (a process that ensures that data for an individual is not revealed or derivable), tabulated summaries were published.

Computer Edit and Imputation

The data from each farm record were subjected to a detailed, item-by-item, computer edit. This complex edit:

- Determined whether each record represented an agricultural operation meeting the census farm definition and deleted out-of-scope operations from the file;
- Assigned farm classification codes needed for tabulating the data, including acreage, tenure, product sales, and industry classification code;
- Checked for consistency between and within sections of each record and identified problem data;
- Checked for reasonable relationships between and among data items, values for various sizes of farms, and combinations of commodities, and identified unreasonable relationships;
- Imputed missing or replaced obviously erroneous data for farms based on other information in the record, or on responses of similar farms in the same geographic area.

Data records that failed to meet the census farm definition, or that had undergone substantial computer-generated changes to the data, were reviewed to ensure that the data had been keyed correctly and/or that the changes were justified. Edit referral cases (i.e., cases that failed edit and were flagged by the computer for review) were reviewed for keying accuracy to ensure that the edit results were correct. Any cases for which the computer edit results were found to be unacceptable were corrected as required and re-edited.

Whenever possible, edit imputations, deletions, or other changes were based on related data contained in the respondent's report form. For some items, such as operator characteristics, data from previous censuses could be used. Values for missing or unacceptable reported data were calculated based on reported quantities and known prices, or by using information from other, generally similar operations.

Estimation

Estimates were produced from two components, a list frame component and an area sample component. With regard to the list component, all farm operations on the census list were mailed report forms.

Since the area component involved sampling, on average, each operation found in the area component represented about 20 other farms that would not have been found in the original list. As a result, the data from the farming operations found in the area component were increased or expanded by 20. Only 350 previously unknown farming operations were found in the area component representing 22 percent of the total number of farms.

Although the sample size for the area component insured acceptable precision at the Island level, the sample size was not designed to adequately estimate municipio-level data. Increasing the sample size of the area component to an acceptable degree of precision at the municipio level was financially unfeasible. Therefore, a method was devised to redistribute the area component data back to municipio-level estimates by utilizing the area component sample design and farm type designation.

To reduce variation in the area component sample, municipios were assigned to one of nine clusters (See Preparatory Operations). In addition, every record in the agriculture census (both from the list and the area component) was classified based on one of thirteen farm types. Expanded data across municipios for each farm type within a cluster were redistributed with weights derived from list and unexpanded area counts at the municipio level for each farm type within a cluster. Cluster level by farm type and, subsequently, island-level estimates for the area component remained static with only the municipio-level data changing.

TABULATION AND DATA REVIEW

Tabulations

NASS prepared and published data tables for all farms. Tables showed data for the Commonwealth and for all 78 municipios.

Table Review

Table review was done using a spreadsheet program. Analysts could make changes to the data, and on supervisory approval, the changes were written to the appropriate file. The master data file from which tabulated data were obtained was then updated.

After all the tables had been reviewed, and data and suppression patterns verified, they were created and transmitted to NASS staff in Census and Surveys Division and the Puerto Rico Field Office for review.

Disclosure Analysis

The law which authorizes the census of agriculture also prohibits publishing information that could be used to identify individual respondents. To ensure that confidentiality was maintained, all summarized data were checked prior to publication in a procedure called disclosure analysis. Disclosure analysis involved a review of each data table that had items suppressed that, if published, would: (1) result in direct disclosure of data reported by a respondent, or (2) reveal information about a respondent by derivation – that is, by a data user adding or subtracting a published subtotal from a published total to reveal individual data.

The disclosure guidelines set lower limits on the number of farms that were required to have reported an item before it was published. Since some tables included identical information arranged under several different classifications, the suppression of data in one table required the suppression of the same data in other tables. Publishing the number of farms in a particular size or other category was not considered a disclosure. Disclosure review was completed in Headquarters and the Field Office.

PUBLICATION PROGRAM

The 2002 Puerto Rico Census of Agriculture was published in Volume 1, Geographic Area Series, Part 52, Puerto Rico. It was created using the computer software Pub-Tool at the NASS headquarters in Washington, D.C. The report showed estimates for all farms in the Commonwealth, and the 78 individual municipios. Tables 1-15 contained data for all agricultural operations in Puerto Rico; tables 16-69 showed municipio-level data; and tables 70-75 presented more detailed tabulations for major data items.

The basic data shown for all farms included number of farms; land in farms and land use; tenure, characteristics, and main occupation of operator; hired workers (agregados and sharecroppers); selected data on machinery, equipment, and buildings; use of agriculture chemicals and fertilizers; irrigation; selected farm production expenses; market value of agricultural products sold; farm-related income; livestock and poultry inventory and sales (including sales of livestock and poultry products); crops harvested, including horticultural specialties; and fish and other aquaculture.

Tables 1-69 showed 2002 and comparable 1998 data for each item. Tables 70-75 showed 2002 summary statistics at the Commonwealth level for farms classified by tenure of operator and type of organization, main occupation and age of operator, size of farm (cuerdas), market value of products sold, and type of farm. NASS released the Puerto Rico census data through the Internet, printed reports, and CD-ROM.

Chapter 9. Censuses of Agriculture for American Samoa, the Commonwealth of Northern Mariana Islands, Guam, and the U.S. Virgin Islands

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INTRODUCTION

Historical Background

The agricultural censuses for the U. S. territories and protectorates have been conducted since 1917, with varying degrees of regularity. In 1917, after purchasing the Virgin Islands from Denmark, a special census that included an agricultural enumeration was conducted. The next agriculture census in the U. S. Virgin Islands was not conducted until 1930, when the Federal Government incorporated an enumeration of the islands into the decennial census program. The 1959 Census of Agriculture was the first agriculture census of the U.S. Virgin Islands not taken as a part of a decennial census.

The first agriculture census on Guam was carried out in 1920, as part of the decennial census of that year. From 1930 through 1960, agriculture censuses continued to be done in conjunction with the decennial census program for both Guam and the U. S. Virgin Islands. Beginning in 1964, censuses on Guam as well as the U.S. Virgin Islands were conducted as part of the quinquennial censuses of agriculture, and have been enumerated on a five-year cycle since that time.

The agriculture censuses for American Samoa and the Commonwealth of Northern Mariana Islands (CNMI) also began as part of the decennial census operation. The 2003 census of American Samoa is the tenth census of agriculture of American Samoa, and the second to be conducted strictly as a census of agriculture. The first eight agriculture censuses in American Samoa, beginning in 1920, were taken in conjunction with the decennial census, and agriculture information was collected only for those households that answered affirmatively to a question about agricultural activities asked at the end of the decennial questionnaire. The 2002 census of CNMI is the fifth census of agriculture of CNMI. The first agriculture census was taken in 1970 in conjunction with the decennial census and the practice continued in 1980 and 1990. This is the second agriculture census taken in the Commonwealth of Northern Mariana Islands that was not done as part of the decennial census.

Uses of Agriculture Census Data

The census of agriculture is the principal source of agricultural production data for American Samoa, the CNMI, Guam, and the U.S. Virgin Islands, and is the only source of consistent, comparable data at the detailed geographic level. Census data are used by the local governments to develop and change farm programs, measure the effects of these programs, design and evaluate their own data collection activities, and administer a variety of other programs. Private industry uses census statistics to plan production and distribution of its products, and to design and implement marketing programs aimed at the agricultural community.

Scope and Legal Authority

The census of agriculture is required by law under the “Census of Agriculture Act of 1997,” Public Law 105-113 (Title 7, United States Code, Section 2204g). The law directs the Secretary of Agriculture to conduct a census of agriculture in 1998 and in every fifth year thereafter, covering the prior year. The census of agriculture includes each state, Puerto Rico, Guam, the U.S. Virgin Islands, and the CNMI, and states that the Secretary may include other territories or protectorates in the census program.

Reference Periods and Dates

Reference periods and dates in the CNMI, Guam, and the U.S. Virgin Islands were the same. The enumerations began in January 2003, and collected inventory data (i.e., acreage, numbers of livestock and poultry, etc.) as of the day of enumeration, while crop and livestock production, sales, and expense data were requested for the calendar year 2002.

The agriculture census for American Samoa was conducted one year after the rest of the country. This was because American Samoa was not included in the quinquennial program until 1997, which did not allow time to develop and conduct the census for that year. To maintain consistency in the data, and for reasons of availability of enumerator resources in American Samoa, this one year lag in conducting the census was maintained for the 2002 Census of Agriculture for American Samoa. Crop and livestock sales, production, and expense data were for calendar year 2003, and inventory data were for the day of enumeration.

Farm Definition

The farm definition used in Guam and the CNMI is any place that had sales of agricultural products of \$1,000 or more. This is the same farm definition used in the main U.S. census.

For the U.S. Virgin Islands, the farm definition is any place that had sales of agricultural products of \$500 or more; the same as in previous censuses.

In American Samoa, because of the economic and social importance of noncommercial agriculture, the farm definition was much broader and did not include a minimum value of sales. A farm was defined as any place that produced agricultural products for sale or for consumption by family members.

PREPARATORY OPERATIONS

General Information

The conduct of the 2002 agriculture censuses was a cooperative effort of NASS and the respective territorial governments. Special agreements governing the conduct of the census in each area and general plans for the enumeration were agreed to the year prior to the census. NASS prepared the procedures, edit programs, and tabulation programs for handling the information.

Overall designs for the censuses varied slightly among the areas. In Guam and the U.S. Virgin Islands, lists of farmers were compiled by the local departments of agriculture based on information available to them through their own efforts at collecting information on agriculture activity in their areas. In the CNMI, the U.S. Department of Commerce was able to provide a listing of all agricultural producers through their business licensing records. In all three areas, this use of list-based enumeration resulted in the most efficient method of data collection. In American Samoa, because of the broad farm definition and the high percentage of households that have agricultural activities, a combination of a list of commercial farms provided by the American Samoa Department of Agriculture, and a sample of all remaining households were enumerated. General plans for the censuses were formalized in special agreements negotiated by NASS and the respective area governments.

Special Agreements

Prior to conducting the agriculture censuses, the responsible officials of the local government agencies signed memoranda of agreement with the NASS for carrying out agriculture censuses in their jurisdictions. Under the terms of these agreements, the governments of the respective territories assumed responsibility for appointing a census coordinator (this can be either a person or an agency) and for conducting the field enumeration. The coordinating agency was responsible for:

- Recruiting qualified personnel for census jobs;
- Training persons hired for the census to follow procedures established by NASS;

- Determining local pay rates, subject to review by NASS for consistency and available funding;
- Arranging office space, equipment, and supplies required by the census operation within each jurisdiction;
- Maintaining administrative and financial records for the census and providing this information to NASS; and
- Publicizing the census locally (NASS provided promotional materials).

NASS was responsible for procuring and distributing manuals, supplies, and for the development of any special procedures that might be required for the enumeration within each territory, together with designing (in consultation with the respective local governments) and printing the report forms, instruction manuals, training materials, and related forms. In addition, the agency provided training for the enumerators and crew leaders, established a calendar of operations, and provided technical advice, as needed, to clarify concepts and procedures. NASS also bore the total cost of the agriculture censuses in each area, with the exception of American Samoa, where the cost was split between NASS and the U.S. Department of Interior's Office of Insular Affairs.

Report Form Content

NASS designed the report forms for all the areas in cooperation with the respective governments. The report forms for Guam, the U.S. Virgin Islands, and the CNMI were similar in design and layout. Each form was a single sheet measuring 17" x 14" folded to 8-1/2" x 14", with four numbered pages. Each form requested information on land in farms and land use, farm labor, organization, crops harvested (acres and pounds) for sale, vegetables or melons (acres and pounds harvested for sale), fruits, nuts, and nursery crops (inventory and pounds harvested for sale), livestock and poultry (inventory and sales), fish and other aquaculture (number and acres of ponds, quantity (pounds), and value of sales), total value of agricultural products sold, expenditures, operator characteristics, and irrigation.

The report form for American Samoa was similar to the other report forms. It collected additional data on home consumption, sources of financing, fishing, and demographic data on members of the household.

PREPARATION OF ENUMERATOR MATERIALS

Printing Report Forms and Enumeration Materials

Report forms, materials for the enumerator record books, and administrative forms used in the 2002 agriculture censuses for Guam, the U.S. Virgin Islands, and the CNMI, and the 2003 agriculture census of American Samoa were printed by private contractors supervised by the U. S. Government Printing Office. NASS forwarded the materials to the respective census managers for distribution to the field staff.

Staffing and Training

The area governments appointed census coordinators who were responsible to NASS for the conduct of the enumeration in their areas, i.e. Guam, the U.S. Virgin Islands, American Samoa, and the CNMI. The coordinating agency in the Virgin Islands and Guam was the respective Department of Agriculture. In the Commonwealth of Northern Mariana Islands and Samoa, the coordinating agency was the respective Department of Commerce. Their responsibilities were broad and included precensus preparatory activities such as securing office space, recruiting, testing, and selecting personnel, and publicizing the census. They also had general supervisory responsibility for the enumeration and for keeping NASS headquarters informed about the

progress of the enumeration. Under the direction of the coordinating agency, the existing organization and staff were used to conduct the census.

Census staffs in all areas except Guam received salaries as temporary employees of the local governments. In Guam, the enumeration was done by permanent employees of the Guam Department of Agriculture on a reimbursable arrangement.

In Guam and the U.S. Virgin Islands, relatively little clerical work was done at the area offices. The census coordinators were responsible for ensuring that once the enumeration was complete all required materials were secured and forwarded to NASS headquarters for processing and tabulation.

In American Samoa, manual editing and keying of data were done in the local office. In CNMI, manual editing, keying, and computer editing and analysis were performed by the local personnel.

NASS staff visited the CNMI, Guam, and the U.S. Virgin Islands in December 2002 and January 2003, to train the census coordinators, crew leaders, and enumerators. Some enumerators left the census operation prior to completing the census; replacements were hired and trained in enumeration procedures by the census coordinators.

DATA COLLECTION

Enumeration Methodology

The census employed personal interviewing by a field enumerator for the agriculture censuses for all the areas. When visiting a place for field enumeration, enumerators identified the "operator" as the person with day-to-day management of the farm and interviewed that person to obtain the necessary information. For partnerships, the partner in charge of the actual farm operations, or the senior partner, was listed as the operator.

For places with two or more tracts of land, the enumerator completed a single report form covering all the land operated by one person, regardless of location. The enumerator identified the location of each tract of land included on the form to avoid duplication of the data. Operators with land and agricultural activities in more than one geographical area were enumerated in the geographical area in which the primary agriculture activity was located. Once the enumerator identified the person who operated the farm, and could supply the requested information, he or she assigned the place a 10-digit farm serial number as a unique identification and wrote it into the appropriate space on the report form, then went ahead with the interview.

Call Backs

For a variety of reasons, other than an operator's outright refusal to respond, enumerators sometimes were unable to complete report forms during the first visit to a household. In these cases, the enumerator made arrangements for a return visit, a call back at a time convenient to the operator. Call backs were made as soon as possible after the initial visit, but enumerators were not to conduct more than two personal visit call backs to the same respondent unless the crew leader decided special circumstances warranted additional attempts.

Refusals

When an operator refused to respond to the census, enumerators were instructed to first try to persuade the operator to provide the data needed and to explain the legal requirement for response. When individuals continued to refuse to cooperate, the enumerator identified the case either as a partial or complete refusal (some refusals did provide partial information) in the record book and reported the case to the crew leader or to the

office supervisor. The crew leader was then responsible for determining the correct course of action for obtaining the data.

Field Review

Crew leaders were responsible to the census coordinator for the actual conduct of the enumeration. They supervised and reviewed the work of their enumerators, and made periodic progress reports. In addition, crew leaders verified the cumulative figures reported by each enumerator.

Results

In CNMI, the agriculture census counted 214 farms with 2,353 acres, of which 882 were in cropland. Guam's agriculture census enumerated 153 farms with 1,648 acres, of which 1,230 acres were in cropland. In the U.S. Virgin Islands, the census counted 191 farms, with 9,168 acres, of which 911 acres were cropland. The average farm size in the four areas ranged from 3.0 acres in American Samoa to 54.5 acres in the U.S. Virgin Islands.

DATA PROCESSING

General Information

Data processing for all four censuses was done in the same manner. After check-in and review of any problem cases, the information was keyed from the report form to a computer data file. The resulting computerized records were subjected to a detailed computer edit for consistency and reasonableness. In addition, the edit corrected obviously erroneous or inconsistent data, supplied missing data based on imputation using characteristics from similar farms to impute information, and assigned farm classification codes needed in tabulating the data. Any significant change by the edit to respondent data was reviewed and verified by agricultural analysts.

Before publication, NASS statisticians reviewed the tabulations for inconsistencies and potential coverage problems. Totals were compared to previous census data, as well as other available information, and potential problems were examined. When necessary, the staff made corrections to the data records and retabulated the affected totals. In CNMI, the entire process of precomputer processing, keying, editing, and analysis was done by the census coordinator with only the final analytical review and tabulation being done by NASS staff in Washington. In American Samoa, precomputer processing and data keying were done on-site before shipping files and materials back to NASS headquarters in Washington, D.C. In Guam and the U.S. Virgin Islands, only the precomputer processing was done in the field; the census coordinator then boxed and shipped the report forms directly to NASS for data preparation and processing.

Precomputer Processing

After the field enumeration was complete, individual report forms were reviewed to ensure that the form contained a valid farm serial number and enumeration district number, correct geographic area code, complete name and address of the operator, positive entry under land in agriculture, and values for either crop production or livestock/poultry inventory.

The edit identified operations that did not meet the farm definition; each case was verified by the census coordinator. Data for the remaining operations were reviewed for accuracy, consistency, and completeness. Errors in computations, units of measures, data inconsistencies, misplaced entries, and so on, were corrected. Missing information was derived from valid reported data for similar type and size farms in nearby areas.

After the precomputer processing review, data from each operation were keyed into a database on microcomputer equipment using an Integrated Microcomputer Processing System. The processing system was designed by the U.S. Department of Commerce, Bureau of the Census to key, edit, analyze, and tabulate data from censuses and surveys.

COMPUTER PROCESSING

General Information

After keying the data from each report form, an item-by-item computerized edit was conducted for each record. Analysts reviewed and verified any substantial changes generated by the computer edits to the data file prior to tabulation. The data were tabulated by geographic level and for each area as a whole, and NASS statisticians reviewed all tabulated totals to identify inconsistencies and potential coverage problems. The statisticians carried any required corrections to the individual data records and the specific totals involved were retabulated. After disclosure analysis, the data file was ready to be released for publication.

Computer Edit and Tabulation

The data were edited by computer for completeness and consistency. Inconsistent entries or suspicious data were identified by the edit program and were reviewed by analysts. These data were then compared to previous census data, as well as to other available information, to determine if a problem existed with the data. The interactive computer system enabled analysts to review up-to-date tallies of selected data items for various criteria or sets of criteria which could include geographic levels, farm types, sales levels, or other specific characteristics. Errors or problems were reviewed and researched by reexamining individual data records. Corrections were keyed to the records and corrected data files re-edited.

Whenever possible, edit imputations, deletions, or other changes were based on related data from the respondent's report form. For some items, such as operator characteristics, data from previous censuses could be used. Values for missing or unacceptable reported data were calculated based on reported quantities and known prices, or by using information from other, generally similar farm operations. The data from the individual records then were tabulated to produce the statistical table files that would be used for publication.

Disclosure Analysis and Table Review

NASS is prohibited by law from publishing any information that could be used to identify individual respondents to any of its censuses or surveys. To ensure that confidentiality is maintained, all data tabulations were checked prior to publication in a procedure called disclosure analysis. This involved a review of data tables that identified and suppressed specific items that, if published, would:

- Result in direct disclosure of data reported by a particular respondent; or
- Reveal information about an individual by derivation, i.e. by a user adding or subtracting a published subtotal from a published total.

After disclosure analysis was completed, appropriate suppressions were applied to the data. Final tables were then reviewed by NASS analysts for accuracy, consistency, and completeness of disclosure protection.

Publication Program

NASS released the summarized data in two steps to provide data users with the information as soon as possible. The first step was to release the tables, along with a condensed version of text material on the NASS Internet homepage. This was done at the time of final approval of the tables, but before the entire publication package had been sent to the printer. Hence, delays in releasing the data, while waiting for minor wording changes or the contractual agreements with printing companies to be worked out, were avoided. Once the text material was completed and reviewed, the publication package was contracted out to a printer to produce copies. Census results for CNMI and Guam were available to the public in July and September 2004 respectively. Results of the census for the U.S. Virgin Islands and American Samoa were released January and October 2005, respectively.

The census report for American Samoa showed statistics for the territory, districts, and counties. For CNMI, data were shown for the Commonwealth, the Island of Rota, the Island of Saipan, the Island of Tinian, and for the Northern Islands. The report for Guam showed data for the island, and for 19 election districts. The report for the U.S. Virgin Islands showed statistics for the territory, for Saint Croix, and for Saint John and Saint Thomas (combined). The statistical tables included data on number of farms, farm characteristics, land in farms and land use, operator characteristics, selected farm expenses, acres planted, amount harvested, sales value of fruits, nuts, vegetables, and field crops, selected machinery and equipment, and inventory and sales of livestock and poultry and their products.

Chapter 10. 2003 Farm and Ranch Irrigation Survey

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INTRODUCTION

General Information

The agriculture census began collecting selected data about on-farm irrigation in 1890. In 1900, Congress authorized a census of farms using irrigation. The U.S. Department of Commerce, Bureau of the Census conducted censuses of irrigation as part of the decennial censuses through 1950. A survey of on-farm irrigation in selected states was added to the 1954 and 1959 Censuses of Agriculture. Since 1959, on-farm irrigation surveys have been conducted using samples drawn from the agriculture census list frame. In February 1997, Congress transferred responsibility for the census of agriculture from the U.S. Department of Commerce to the U.S. Department of Agriculture, National Agricultural Statistics Service (NASS). This authority included subsequent farm and ranch irrigation surveys.

The 2003 Farm and Ranch Irrigation Survey (FRIS) is the sixth survey devoted entirely to collecting on-farm irrigation data for the United States. The 2003 and 1998 surveys published data for all 50 states. Surveys prior to 1998 published data for the leading states along with a U. S. total, excluding Alaska and Hawaii.

Agricultural production is a major user of fresh water in the United States. Based on the 2002 Census of Agriculture, 14.1 percent of all farms in the United States were irrigated. Those farms accounted for approximately 17 percent of total cropland. Information on agricultural irrigation is crucial to legislators and policymakers, economists, farmers, planners, and hydrologists concerned about the Nation's supply of both food and fresh water.

NASS conducted the 2003 FRIS under the provisions of Title 7. The survey supplemented basic irrigation data collected from all farm and ranch operators in the 2002 Census of Agriculture. A sample of 2002 census respondents who reported using irrigation provided detailed information about their irrigation practices.

Scope and Reference Year

The farm and ranch irrigation survey is typically conducted for the year immediately following the agriculture census reference year. Therefore, following the 2002 Census of Agriculture, the 2003 FRIS was undertaken. Data collection was completed during the first five months of 2004. The survey sample was drawn from respondents reporting on-farm irrigation on their census report forms in the 2002 Census of Agriculture.

The survey requested detailed data from about 1 in every 12 respondents reporting on-farm irrigation in the 2002 census. Sampling was designed to provide reliable estimates of irrigation practices for the United States, 20 Water Resources Areas, and all 50 States. The survey asked respondents to supply data on land use, irrigation, maintenance expenditures, and irrigation practices for calendar year 2003. Data on irrigated and nonirrigated crops were requested for the 2003 growing season.

Estimation

Estimates were produced for the Nation as a whole, for each of the 50 States, and for the geographic domains known as Water Resources Areas (WRA). The estimation methodology accounted for both selection of the survey sample and survey nonresponse. The estimator for the state totals was a direct expansion reweighted estimator. The assumption underlying this weighting approach to survey nonresponse was that survey respondents and nonrespondents within a stratum constitute a homogeneous population, thus allowing respondents to represent nonrespondents. National estimates were obtained by summing across all states. The WRA estimates were obtained by summing the expanded data values for the portion of the sample in the WRA.

PREPARATIONS

Planning

Planning for the 2003 FRIS began in 1999 when an integration team was developed and chartered to investigate a proposal to merge FRIS and Agricultural Resource Management Survey (ARMS) data collection. The primary reason for the merger was to minimize asking the same questions on both surveys. Several issues prevented the merger from developing as planned. ARMS data are collected on a voluntary basis like most NASS core program surveys, whereas FRIS data are collected on a mandatory basis like the census of agriculture. Secondly, FRIS collects detailed irrigation practices data, whereas ARMS collects primarily cost of production data.

To help facilitate report form development, NASS mailed letters to selected persons in water-related government organizations, the irrigation and agriculture industries, and colleges and universities asking for comments and suggestions on content to include or exclude in FRIS. NASS staff reviewed the responses from these data users to evaluate data needs.

Sample Design and Selection

NASS designed the sample for the 2003 FRIS to produce a relative standard error not to exceed 5 percent on estimated irrigated acreage for the United States and at the state level. NASS calculated that these requirements could be met with a sample of 25,014 irrigation operations. The universe from which the sample was selected included all farms or ranches – excluding institutional, research, experimental, and horticultural specialty operations – with over \$10,000 in sales that reported using irrigation in the 2002 Census of Agriculture.

All farm operations eligible for the survey were stratified into stratum groups on the basis of total irrigated acres reported in the 2002 census. Stratum assignment within each stratum group was based on the 2002 reported irrigated acreage, and varied from stratum group to stratum group. The sample design consisted of a stratified systematic sample selected independently from each of the 50 state frames.

The sample included all farms that reported a minimum number of irrigated acres in the 2002 Census of Agriculture. State sample sizes, necessary to obtain the desired level of precision, were determined by analyzing the variation of the total acres irrigated variable in each state's sampling frame. These sample sizes were adjusted using historical nonresponse data to account for expected nonresponse to the survey. The total national sample size was 25,014 farms; 1,823 of these farms were selected from the certainty strata and the remaining 23,191 farms were systematically selected from the noncertainty strata. The 2003 sample size of 25,014 farms was six percent larger than the 1998 FRIS sample.

DATA COLLECTION

General Information

Methods used in conducting the 2003 FRIS were very similar to those used during the 1998 FRIS. Data collection for the 2003 FRIS was conducted primarily by mail and was supplemented by telephone calls and personal enumeration by NASS Field Office staff and National Association of State Departments of Agriculture (NASDA) enumerators under contract with NASS. Data collection was completed in May 2004, and the publication results were released November 15, 2004.

Mailout and Follow-up

The U.S. Census Bureau, National Processing Center (NPC) in Jeffersonville, IN printed and labeled the report forms. The mail label file was a computerized format compiled by NASS. NPC also handled the mailing of the report form packets. A total of 25,014 report forms were mailed in January 2004. The initial mail packet included a report form and a letter requesting a prompt response. The operators were asked to complete and return the report form to NPC. Undeliverable As Addressed (UAA) mail returned to NPC with updated addresses were remailed. UAA mail that did not have an updated address on the envelope was reviewed by NPC staff and remailed if a better address was found. Those UAAs for which a better address could not be found were sent to the appropriate Field Office. The initial mailing was followed by one follow-up mailing to everyone who had not responded in the first four weeks. Follow-up packets included a reminder letter and a report form.

Six weeks after the initial mailing, the Field Offices were provided nonresponse lists. Given the limited size of the survey sample, data from large scale irrigators were considered critical to developing reliable statistical estimates, and these cases were subjected to intensive follow-up. The Field Offices made telephone calls and personal visits to the nonrespondents to maximize response and obtain as much data as possible, especially basic acreage, crop, and irrigation data.

Receipt, Check-in, and Correspondence

Completed report forms, as well as undeliverable as addressed mail, were returned to NPC for check-in and data processing. Report forms with attached correspondence, including congressional correspondence – notes indicating a respondent intended to contact a congressional office – were pulled from the processing operation and reviewed by NASS staff at NPC. NASS staff resolved the concerns raised by the correspondence and subsequently processed the data.

Telephone Assistance

The initial mailing packets and the follow-up packets included a toll-free telephone number for respondents to use if they had questions about the survey or needed assistance in completing their report form. These calls were routed to various Field Offices where staff provided assistance to any respondents who needed help. The Field Offices also answered any questions callers had about requirements to respond and whether or not their farm qualified as an irrigation operation for the purposes of the survey.

Response Rate

The 2003 Farm and Ranch Irrigation Survey attained a final overall response rate of 79 percent. This was about 9 percent greater than the final response rate obtained for the 1998 survey.

DATA PROCESSING

General Information

The 2003 FRIS report forms were returned to NPC for data processing. All the forms were reviewed upon receipt and check-in to identify significant inconsistencies and to ensure that the data entries could be keyed to the data file. Remarks by respondents were reviewed for possible response by the agency or to make certain accurate information was added to the data file. Any inconsistencies or obvious errors were corrected before keying. After the data were entered into the data file, the file was subjected to a detailed computerized review. Records needing resolution were edited by NASS staff. Before publication, the tabulations from the 2003 FRIS

data file were reviewed by headquarters staff, NASS staff at NPC, and staff from the Field Offices using data from the 2002 census to identify inconsistencies and potential coverage problems.

Pre-Data Entry Review

NASS staff received report forms on a flow basis and reviewed them prior to data entry. This process involved reviewing the forms to ensure that the operation was in-scope, i.e. met the criteria to be included in the tabulations, and make sure they met key from image and scanning requirements. If the operation did not meet the criteria for an in-scope irrigation operation, then the report form was marked out-of-scope and excluded from the tabulations. However, report forms from large farms that reported irrigation in the 2002 census but none in the 2003 FRIS were followed up by telephone to clarify the discrepancy. After determining that a report form was in-scope, staff conducted an item-by-item review of the form, using written edit guidelines. NASS headquarters staff also provided assistance with prekey editing of the report forms. The review checked for the completeness, consistency, and accuracy.

Data Entry

Report forms were scanned prior to data entry. Report form data were keyed from the scanned computer images. Quality control procedures for the 2003 FRIS data keying operation involved rekeying approximately 20 percent of the keyed records to validate the data and ensure quality.

Computer Edit and Final Edit

The individual data from all the report forms were passed through a computerized edit review. An initial review identified missing entries, entries outside acceptable ranges, and inconsistencies between predefined items. Based on the number and types of problems identified during the initial review, analysts either accepted computer edit procedures to correct individual data items, or initiated corrections of data items on a record-by-record basis.

Tabulation

Survey data were tabulated using Statistical Analysis System (SAS) software. The tabulation program compiled 42 tables containing detailed irrigation data from farm operators reporting irrigated land in the 2002 census and the 2003 FRIS. Tabulated data were reviewed by statisticians, both at headquarters and in the respective Field Offices, for inconsistencies and potential coverage problems and compared to the 2002 Census of Agriculture data. Corrections, if necessary, were made to the data file before running the final tabulations and releasing the statistics for publication. Final results were reviewed by a board of NASS statisticians to ensure that published results were consistent with known changes in farm irrigation.

PUBLICATION

General Information

Data from the 2003 Farm and Ranch Irrigation Survey were published in Volume 3, Special Studies, Part 1. Published data were also accessible on the Internet at www.nass.usda.gov. The published data presented

summary irrigation data for all states, with more detailed tabulations for individual states and the 20 Water Resources Areas. Most tables included 1998 FRIS historical data for comparison. The tables showed data for calendar year 2003 on farms irrigated by:

- Land use;
- Quantity of water applied;
- Land irrigated and method of water distribution;
- Estimated quantity of water applied by source: wells and pumps on farms;
- Selected expenditures for energy, equipment, and maintenance;
- Selected crops harvested;
- Application of chemicals;
- Other uses of irrigation water;
- North American Industry Classification System;
- Market value of crops sold;
- Water management systems used;
- Participation in government programs;
- Energy and water conservation improvements;
- Sources of irrigation information used to reduce costs;
- Farms with diminished crop yields resulting from irrigation interruption by cause;
- Discontinuance of all irrigation by reason.

Within the 2003 FRIS publication, there is a map that shows 2003 precipitation as a percent of normal precipitation for the United States. This map was included for reference purposes only.

Water Resources Areas

The 2003 FRIS data were tabulated by Water Resources Areas (WRA). These boundaries are essentially the same as the Water Resources Regions (WRR) as delineated and defined in the past by the U.S. Water Resources Council. The areas differ somewhat from the regions because of the method used for boundary delineation. Region boundaries are delineated on the basis of topographic drainage characteristics, whereas areas are delineated on the basis of county boundaries approximated to actual drainage-basin boundaries.

Table 10-1. Water Resource Regions for the 2003 Farm and Ranch Irrigation Survey

Region number	Region name	Region number	Region name
01	New England	11	Arkansas-White Red Region
02	Mid Atlantic	12	Texas-Gulf
03	South Atlantic-Gulf	13	Rio Grande
04	Great Lakes	14	Upper Colorado
05	Ohio	15	Lower Colorado
06	Tennessee	16	Great Basin
07	Upper Mississippi	17	Pacific-Northwest
08	Lower Mississippi	18	California
09	Souris-Red-Rainy	19	Alaska
10	Missouri	20	Hawaii

Comparability of Data

Differences existed between the expanded results of the 2003 FRIS data and published data in the 2002 Census of Agriculture. Significant differences included:

- FRIS data excluded horticultural specialty operations with more than \$10,000 in sales and institutional farms;
- FRIS excluded operators who were misclassified as irrigators in the 2002 census and who did not irrigate in either 2002 or 2003.

Otherwise, 2003 survey data were collected, processed, weighted including adjustment for incompleteness, and tabulated in a manner similar to 2002 census data.

Chapter 11. 2005 Census of Aquaculture

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INTRODUCTION

Background

The 2005 Census of Aquaculture is the second national census conducted by the U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS), to collect data about the industry. The first aquaculture census was conducted in 1998 in response to the intense need for an accurate measure of the aquaculture sector. Limited aquaculture data have been collected by the census of agriculture since 1974.

Purpose and Scope of the Census

The 2005 Census of Aquaculture expanded the aquaculture data collected in the 2002 Census of Agriculture and provides a current and comprehensive picture of the aquaculture sector. The aquaculture census collects detailed information relating to production methods, surface water acres and sources, production, sales, point of first sale outlets, aquaculture distributed for restoration or conservation purposes, and farm labor.

Uses of the Census

The census of aquaculture provides statistics at the national and state levels. Aquaculture census statistics are used by Congress to develop, evaluate, and change farm programs. Many national and state programs use the data for rural development planning, land use management, and water resource management. Private industry uses the census statistics to provide more effective production and distribution systems for the aquaculture community.

Authority and Area Covered

The census of aquaculture is covered by Public Law 105-113, the Census of Agriculture Act of 1997 (Title 7, United States Code). The census of aquaculture is a follow-on census to the 2002 Census of Agriculture and provides detailed statistics on aquaculture.

PREPARATIONS

Data Needs

The content of the aquaculture census report form was developed through consultation with various aquaculture industry advisors and several USDA agencies. The National Aquaculture Association, the Advisory Committee on Agriculture Statistics, and the USDA Cooperative, State, Research, Education, and Extension Service provided NASS initial insight on the content of the report form. They also helped coordinate efforts with advisors across all sectors of the aquaculture industry to provide valuable input for the content of the report form.

Report Form Development

Several changes were made to the 2005 report form based on lessons learned from the first aquaculture census conducted in 1998. The primary focus was on improving the quality of sales data collected. More than 50 specific aquaculture species were pre-listed to avoid confusion. This compared to less than 25 specific species that were prelisted on the 1998 report form. Additional sections were added with questions tailored to specific sectors of the aquaculture industry. Questions were designed so that all reported sales information could be

converted and published in one standard unit, regardless of how the data were originally reported. For most of the species listed in the 2005 publication, the number sold, pounds sold, and total dollars received were published.

Other changes included: additional versions of the report form were created to correspond with aquaculture production in specific states, the production methods list was expanded, an organically raised aquaculture question and a farm employment section were added, and the cooperative agreements and contracts section and the estimated value of products distributed question were removed.

DATA COLLECTION

Target Population and List Frame Development

The target population for the census of aquaculture was all commercial or noncommercial places from which \$1,000 or more of aquaculture products were produced and either sold or distributed during the census year. Commercial operations qualified with sales greater than or equal to \$1,000. Noncommercial operations included operations that produced an estimated value of \$1,000 or more of aquaculture products, but released or distributed their production for purposes of restoration or conservation. Examples of noncommercial operations included Federal, state, or tribal hatcheries.

The list of farms was created from operations on the NASS list frame that were identified as having aquaculture. The majority of these operations were identified as the result of the 2002 Census of Agriculture and the annual catfish and trout surveys conducted by NASS. The list of names was supplemented from various list sources obtained by NASS.

Enumeration

The 2005 Census of Aquaculture used a combination of mail, telephone, and personal interviews. Respondents also had the opportunity to complete their form over the internet. The report forms were mailed in mid-December 2005 to all identified aquaculture producers on the census mail list. Different versions of the report form were used. Catfish and trout farmers located in states participating in the NASS annual catfish or trout program received a report form asking for information required of the annual NASS programs. The remaining operations on the census mail list received the other report form. All mailings included a cover letter and a postage-paid return envelope. Follow-up telephone calls and personal interviews were used to collect data from non-respondents.

EDITING DATA AND RESOLUTION OF NONRESPONSE

All report forms were reviewed for legibility and data entry irregularities prior to keying. All data were passed through a computer edit to check for data integrity. Data entries of large magnitude were reviewed by statisticians and verified or corrected. Every effort was made to correct all inconsistencies, errors, or omissions in reported data. Editing of catfish and trout data utilized historical comparisons to previously reported NASS survey data for water usage, inventory, production, and sales. Data from the 2002 Census of Agriculture were also available for review. Non-response to particular questions on the reports was resolved.

DATA PROCESSING

An Interactive Data Analysis System was developed to identify and correct keying errors, missing data, and erroneous data entries. Analysis included a review of the distribution of items in the data set, and outliers were

investigated and verified or corrected. Prior to publication, tabulated totals were reviewed to identify any remaining inconsistencies.

CENSUS NONSAMPLING ERROR

Incorrect or incomplete responses to the census report form or to questions posed by an enumerator could introduce error into the census data. To reduce reporting error, each respondent's answers were checked for completeness and consistency by the edit. The accuracy of the census could also be affected by other non-sampling error sources, including incorrect data keying, editing, and imputing for missing data. Every effort was made to minimize these errors.

PUBLICATION

Data from the 2005 Census of Aquaculture were published in Volume 3, Special Studies, Part 2. Published data were also accessible on the Internet at www.nass.usda.gov. The publication provided information on the number of farms and the market value of aquaculture products sold for each state and the United States. In addition, selected data items for each state and the United States were presented.

Chapter 12. Publication Program

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OVERVIEW

The purpose of the census of agriculture collects and disseminates comprehensive, complete statistics on agriculture in the United States to the general public, government offices, farm organizations, agribusiness, and Congress. Consequently, the publication program was designed to make census data available to users as economically and in as many formats as possible. Data were released in a variety of media formats including print, CD-ROM, and on the NASS website in text, PDF, and CSV manipulable files. Census data were released in three volumes: Volume 1, Geographic Area Series; Volume 2, Subject Series; and Volume 3, Special Studies.

SPECIFIC REPORTS

Geographic Area Series (Volume 1)

The 56-part Volume 1 Geographic Area Series, State and County Data (AC-02-A-1 to 56), included final state and county (or equivalent) detailed data for the 50 states, United States Summary, Puerto Rico, Guam, the U. S. Virgin Islands, Commonwealth of Northern Mariana Islands, and American Samoa. The U.S., states, and Puerto Rico reports were released in print, on CD-ROM, and on the Internet in text, PDF, and CSV formats. The Guam, U.S. Virgin Islands, Commonwealth of Northern Mariana Islands, and American Samoa reports were released in print and on the Internet in text and PDF formats.

In addition, several specialty products were developed using volume 1 data. These included a summary of the New England region, summaries of selected demographics of U.S. farm operators and operators by race, State and County Profiles, an American Indian Reservations report, the Ranking of Market Value Agricultural Products Sold report, and the Top Commodities report. Data for these products were extracted from Volume 1 information and were released on the Internet in several different product formats.

Subject Series (Volume 2)

This 2002 census series included five reports: Agricultural Atlas, Ranking of Congressional Districts, ZIP Code Tabulations of Selected Items, Congressional District Tabulations, and History of the Census of Agriculture.

Agricultural Atlas (AC-02-S-1). The Agricultural Atlas of the United States provides maps illustrating national agricultural statistics. It features a series of maps highlighting agricultural activities and characteristics such as farm number and size, selected crops harvested, livestock and poultry inventories and sales, agricultural sales, production expenses, land use, irrigation patterns, fertilizer and chemical use, and machinery and equipment inventories. Data display some changes from 1997-2002 and cover the United States, states, and counties. Data were released in print, on CD-ROM, and on the Internet.

Ranking of Congressional Districts (AC-02-S-2). The Congressional Districts Ranking report presents selected 2002 Census of Agriculture statistics ranked by the congressional district of the 108th Congress. Data were released on CD-ROM and on the internet in text, PDF, and CSV formats.

ZIP Code Tabulations of Selected Items (AC-02-S-3). The ZIP Code Tabulations of Selected Items shows selected agricultural statistics by five-digit postal ZIP Code. Data were released on the Internet in CSV format.

Congressional District Tabulations (AC-02-S-4). The Congressional District Tabulations report presents selected 2002 Census of Agriculture statistics ranked by congressional districts of the 108th Congress. Data are

presented by congressional district for all states, except Alaska, Delaware, Montana, North Dakota, South Dakota, Vermont, and Wyoming, which are considered “at large” states. The state total is presented for these seven states. Data were released on the Internet in text, PDF, and CSV formats.

History (AC-02-S-5). The History publication describes the major census operations for the 2002 Census of Agriculture, including the follow-on censuses and surveys and the censuses of outlying areas. It was released in print and on the Internet.

Special Studies (Volume 3)

The Volume 3, Special Studies series consisted of the 2003 Farm and Ranch Irrigation Survey (FRIS) and the 2005 Census of Aquaculture. Both reports were released in print and on the Internet.

2003 Farm and Ranch Irrigation Survey, AC-02-SP-1. The 2003 Farm and Ranch Irrigation Survey contains irrigation data for the United States, for individual states, and for the 20 Water Resources Areas. It represents the results from a sample survey of farm and ranch operators who reported using irrigation in the 2002 census. Data include acres irrigated, yields of specified crops, method of distribution, quantity and source of water used, number and depth of wells, pumps used in moving water, energy use, and expenditures for maintenance and investment. In addition, the report includes some comparative data from the 1998 FRIS. It was released in print and on the Internet in text, PDF, and CSV files.

2005 Census of Aquaculture, AC-02-SP-2. The 2005 Census of Aquaculture provides data on size of operation, methodology, sales by category, losses, irrigation, and other topics. This was the Nation’s second census of aquaculture. The first was conducted in 1998. The report is available in print and on the Internet.

Appendix A: Provisions of Title 7 Relating to the 2002 Census of Agriculture

OVERVIEW

The 2002 Census of Agriculture and follow-on censuses and surveys are conducted under the provisions of Title 7 U.S.C. Previously, the census program was conducted under the provisions of Title 13 U.S.C. This change in legal authority resulted from the transfer of the census of agriculture from the U.S. Department of Commerce to the U.S. Department of Agriculture.

Essentially, the provisions to conduct censuses and its components are the same under Title 7 as they were under Title 13 U.S.C.

Applicable sections of Title 7 U.S.C. as they relate to the 2002 Census of Agriculture follow.

PROVISIONS OF TITLE 7, U.S.C.

CHAPTER 55 – Department of Agriculture

Sec. 2204g. Authority of Secretary of Agriculture to conduct census of agriculture

(a) Census of agriculture required

In 1998 and every fifth year thereafter, the Secretary of Agriculture shall take a census of agriculture.

(b) Methods

In connection with the census, the Secretary may conduct any survey or other information collection, and employ any sampling or other statistical method, that the Secretary determines is appropriate.

(c) Year of information

The information collected in each census taken under this section shall relate to the year immediately preceding the year in which the census is taken.

(d) Enforcement

(1) Fraud

A person over 18 years of age who willfully gives an answer that is false to a question, which is authorized by the Secretary to be submitted to the person in connection with a census under this section, shall be fined not more than \$500.

(2) Refusal or neglect to answer questions

A person over 18 years of age who refuses or willfully neglects to answer a question, which is authorized by the Secretary to be submitted to the person in connection with a census under this section, shall be fined not more than \$100.

(3) Social Security number

The failure or refusal of a person to disclose the person's Social Security number in response to a request made in connection with any census or other activity under this section shall not be a violation under this subsection.

(4) Religious information

Notwithstanding any other provision of this section, no person shall be compelled to disclose information relative to the religious beliefs of the person or to membership of the person in a religious body.

(e) Geographic coverage

A census under this section shall include –

- (1) each of the several states of the United States;
- (2) as determined appropriate by the Secretary, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, the United States Virgin Islands, and Guam; and
- (3) with the concurrence of the Secretary and the Secretary of State, any other possession or area over which the United States exercises jurisdiction, control, or sovereignty.

Sec. 2276. Confidentiality of information

(a) Authorized disclosure

In the case of information furnished under a provision of law referred to in subsection (d) of this section, neither the Secretary of Agriculture, any other officer or employee of the Department of Agriculture or agency thereof, nor any other person may –

- (1) use such information for a purpose other than the development or reporting of aggregate data in a manner such that the identity of the person who supplied such information is not discernible and is not material to the intended uses of such information; or
- (2) disclose such information to the public, unless such information has been transformed into a statistical or aggregate form that does not allow the identification of the person who supplied particular information.

(b) Violations; penalties

Any person who shall publish, cause to be published, or otherwise publicly release information collected pursuant to a provision of law referred to in subsection (d) of this section, in any manner or for any purpose prohibited in section¹ (a) of this section, shall be fined not more than \$10,000 or imprisoned for not more than 1 year, or both.

(c) Information provided to Secretary of Commerce

This section shall not prohibit the release of information under section 2204g(f)(2) of this title.

¹ So in original. Probably should be “subsection.”

Appendix B: Historical Notes

ORIGINS OF THE CENSUS

The First Censuses: 1790-1840

The Constitutional Convention in 1787 set many precedents, among which was the incorporation in the governing instrument of the new Nation of a requirement for a periodic count of the population of that Nation for purposes of the equitable distribution to each state of taxes and representation in the House of Representatives. Article I, Section 2, of the United States Constitution required an enumeration of the "whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three-fifths of all other Persons...within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten years..."

The first census was carried out by the new Government in 1790, but even some members of the Constitutional Convention had recognized that a periodic and universal enumeration of the country could be used to gather much useful information on more than the population. James Madison, when a member for Virginia of the first House of Representatives, introduced a bill to use the census to collect information on occupations and other economic subjects, as well as basic data on the age, sex, and race of the population. The House approved the idea, but the Senate rejected it, and Madison had to content himself with a census collecting information only on the number of inhabitants, their age, sex, and whether slave or free. Nevertheless, the rapid growth of the new Nation soon caused the Federal Government and others to look for some means of measuring that growth, and in 1810--during the first administration of President James Madison--items on the kind, quantity, and value of goods manufactured were included in the third national enumeration.¹ From its founding until well into the 19th Century, the United States was primarily an agricultural nation--95 percent of the population counted in the first census lived on the land. The 1820 Census was the first to include any question on agriculture, and it asked only how many persons in each household were engaged in agriculture. (Approximately 70 percent of the total population at the time were so engaged.)

The 1840 Census introduced separate schedules of questions relating to mining, agriculture, commerce, manufactures and trades, and navigation. The agriculture schedule included questions on cereals and other crops, and on livestock, and the results were published with the rest of the census data. Even this expanded information was considered unreliable and lacking in detail, and there were demands that the census collect more detailed information, and that the Government pay more attention to ensuring the accuracy of the data collected and published.

The Agriculture Census

The dissatisfaction with the 1840 Census prompted Congress to give particular attention to the organization and data content of the 1850 Census. A select committee of the House of Representatives recommended that the Federal Government establish a permanent census office. The Senate shared many of the concerns expressed by the House, but declined to support the measure, so a permanent census office had to wait another

¹ The Federal government published a separate report covering the non-demographic data collected in the third census: A statement of the Arts and Manufactures of the United States of America, for the Year 1810. This document may be considered the forerunner of the Census Bureau's enormous economic statistics publishing program.

half-century. Nevertheless, the 1850 Census assumed much of the specialized organization that has since characterized the censuses, and is often considered the first "modern" enumeration.

The increased specialization began at the top, where the Congress transferred the responsibility for supervising the census from the Department of State to the newly formed Department of the Interior. The census was organized into six subject areas for data collection, including agriculture, each with a separate list of questions. The agriculture report form, or "schedule," asked for the name of the person(s) in each household who operated a farm, and made relatively detailed inquiries on acreage and agricultural activities, including quantities produced of selected products; the value of farm implements and machinery, livestock, animals slaughtered, and homemade manufactures; and the cash value of the farm. The 1850 Census publications included the total number of farms for the United States (1.4 million) and each state; acreage (294 million acres under cultivation); and total value of farms, buildings, livestock, machinery, and equipment (nearly \$4 billion).

The censuses became more detailed as the century progressed. The census law of 1879 provided for the appointment by the President (with Senate confirmation) of up to 150 local supervisors for the 1880 Census (at least 1 for each state or territory) as well as for employing specialists to collect data on certain census subject matter areas, such as manufactures and mining. The local supervisors were responsible for the actual data collection, as well as for hiring suitable enumerators. This enlarged staff permitted closer supervision of the enumeration and thus, it was hoped, greater accuracy. The 1880 Census of Agriculture form included new items on tenure, weeks of hired labor, costs for building and maintaining fences, and cost of fertilizer purchased, and used specialized report forms to collect detailed production information on selected crops and livestock.

The agriculture census expanded further for 1890, when the agriculture schedule doubled in length--including new inquiries on agricultural organizations, floriculture, and irrigation--and again used special report forms for selected operations. The population census also collected agricultural data, asking for information on farm mortgages.

The 1900 Agricultural Census introduced a question on the race of the farm operator, but was otherwise similar to the previous enumeration. The 1900 Census saw the agriculture census enter the age of automated data processing when the census staff used punchcards and electric tabulating machines to process and tabulate the statistics (the punchcard tabulating equipment had first been used for processing in the 1890 population census). This equipment tabulated the results of the 1890 population census, and was adapted for the agriculture enumeration by the development and addition of an automatic sorter (required because of the large number of crop cards used in processing the agriculture data) and the use of a new keypunch machine.

REPORT FORM CONTENT AND FORMAT

Content

During the 19th century, the agriculture census schedules asked for simple production quantities and total sales values for selected products, with relatively few items on such things as machinery and equipment, or fertilizers used. Changes to these schedules generally were restricted to changes in the kinds of crops and livestock for which data were requested. The 1900 Census introduced questions on the race and tenure of farm operators, and from then until today, the agriculture census collected a considerable amount of social and economic information, along with the crop and livestock data. During the period between the World Wars, questions were added on such things as the availability of electricity, telephone service, and paved roads, as well as the degree of mechanization of farm operations, and nonfarm employment and income. The race, sex, and ethnic background of farm operators became important objects of the census questionnaire after World War II, and the

1978 and later agriculture census report forms asked for the respondent's sex, and whether he or she was of Spanish/Hispanic origin.

Business organization, off-farm income, and participation in a variety of Federal Government agricultural programs became increasingly important to data users as well. Some information on organization and income had been requested since the 1920's, and following World War II, items were added on participation in various Federal loan and land conservation programs. For 1974, the census questionnaire introduced an item on farm credit and debt, and for the 1987 Census, additional inquiries on production expenses. The 1992 Census added questions on hired farm labor by number of days worked, landlords, sales of products to individuals, injuries and deaths occurring on the farm, and additional detailed crop breakdowns (e.g., wheat by type). Content of the 1997 Census of Agriculture was essentially the same as the 1992 Census. However, because farms were classified according to the new North American Industry Classification System (NAICS), two new commodities – cut Christmas trees, and acres of maple trees and number of maple trees tapped – were added to the census questionnaire. Additional detail on plantain and tanager production was added. Items removed from the 1997 Census included land diverted under annual commodity adjustment programs, and Commodity Credit Corporation loans for honey and rye.

The use of non-sample and sample report form versions continued in 2002. The nonsample report forms contained the items asked of all respondents, while the sample versions included additional questions asked only of the sample of farmers. Unlike 1997, in 2002, the Farm Related Income Section was asked of all respondents.

Two significant data items were collected for the first time in 2002; multiple operator characteristic data on the second and third operators, and production contract data. In 1997 and previous censuses, only data on the principal operator were collected. In 2002, the total count of all operators and the number of those that were female was collected from all farms. Detailed operator characteristic data were collected from a maximum of three operators per farm. Prior to 2002, race data were always collected under the presumption that an operator could be of only one race. The 2002 census allowed respondents to enter more than one race. Consequently, published data for 2002 has a category for operators of more than one race.

The second major change in data content involved production contracts. In addition to the amount of commodities delivered under a production contract, the amount the contract grower received from the integrator or contractor was collected for the first time in 2002. Otherwise, most data items are comparable between the 2002 and 1997 Censuses.

The weighting methodology used for the 2002 census is significantly different than that used for the 1997 census. To ensure comparability of 2002 and 1997 census values, data shown in the 1997 publication were reweighted using the 2002 weighting methodology. Both the reweighted and the originally published 1997 values are displayed in the U.S. Volume 1, Table 1. Historical Highlights: 2002 and Earlier Census Years.

Format

Agriculture censuses employed a field canvass of farm operators until the 1969 Census. During the 19th century, enumerators used pages in large ledger type binders for collecting the agriculture data, but the Census Bureau began using separate agricultural questionnaires in the 1900 Census, and has continued to do so since. (The 1945 enumeration reverted to the binder format as a wartime measure.)

The growing demand for more detailed data, and the opposing demand to reduce respondent burden, led to compromises in every census, and to experiments during the 1940 and later Censuses in tailoring report forms to reflect the special characteristics of agriculture in various parts of the country. Tailored forms typically had

two sets of questions, one asking for basic information of all farm operations, and a second, varying from area to area, covering the crops and livestock produced there. This specialization of report forms reached its peak in the 1964 census, when there was a separate questionnaire for each state, Puerto Rico, Guam, and the U.S. Virgin Islands.

The Bureau of the Census eliminated specialized forms for the 1969 census, when it designed two questionnaires—a short form asking for basic information, and a standard form that included additional items. Tailored report forms² were used only for Hawaii, Puerto Rico, and the outlying areas.

The census used the standard form, for farms in the 50 states which were expected to have \$2,500 or more in agricultural products sold during the census year. The short form went to smaller farms. A similar format was used for the 1974 Census, while the Census Bureau employed a variation of the system in the 1978 Census, with a somewhat longer basic questionnaire used for all farms, but with a "sample" questionnaire that included all the basic items plus six additional sections of inquiries for a sample of about 20 percent of all farms. Larger page size and other format changes enabled the Census Bureau to collect the data needed while reducing overall response burden by over 30 percent.

Standardization simplified the Census Bureau's job in terms of designing, printing, mailing, and processing the questionnaire, but respondents still were unhappy about questions irrelevant to their own operations. For the 1982 Census, the Census Bureau reintroduced regionalized questionnaires for 12 geographic regions of the country, plus separate questionnaires for the outlying areas, and with sample and nonsample³ forms for each region. The agriculture census "regions" did not coincide either with the Census Bureau's census geographic regions or with the USDA's regions, but were simply groupings of states in which the Census Bureau expected to find similar types of crops and livestock operations. The nonsample report form contained all the items requested of all farmers, while the sample version contained both the "core" items requested on the nonsample form and additional questions. The longer form was used for a sample of about 20 percent of all farms. The Census continued to use this system of regionalized sample and nonsample report forms for the 1987, 1992, and 1997 Censuses, although the number of regions was raised to 13. In the 1982 Census, there were 10 multi-state regions, while Florida and Hawaii each made up a region of their own. For 1987 and 1992, Alaska was designated a separate region as well. In 1997 Alaska, Florida, Hawaii, and Texas were separate regions.

Use of regionalized report forms continued in the 2002 census. The 2002 regional report forms used the same basic format and layout as the 1997 report forms. States that comprised each region for the 2002 census are listed in Chapter 5, Data Collection, Table 5-2. For 2002, Alaska, Florida, and Hawaii continued to be separate regions. Texas was combined with New Mexico in 2002.

² The Census Bureau also produced separate report forms for the agricultural services census and the decennial censuses of irrigation, drainage, and horticultural specialties that were carried out as part of the 1969 program.

³ The sample forms were further specialized by the use of "must" report forms. Must forms were used for very large or special operations, and were identical to the other sample forms in content. The Census Bureau used a different shading color for must forms to facilitate identification of these cases during clerical processing.

PROCESSING AND PUBLISHING THE DATA

Processing

Processing the census data during most of the 19th century was a fairly straightforward operation; the enumeration staff returned completed schedules to the census office and the clerical staff tabulated and compiled the data by hand. The introduction of mechanical punchcard and electric tabulating equipment (first used in the 1890 population census, and for the 1900 Census of Agriculture) was a major methodological and technological change, so much so that a comparable transformation in processing waited until the advent of the electronic computer and automated data processing systems half a century later. Technical improvements to the equipment continued throughout the intervening decades, (e.g., the 1940 Census of Agriculture introduced automated editing of the census punchcards) however, the basic systems introduced for processing at the turn of the century remained in place until after World War II.

The Census Bureau played a major role in the development of modern computer technology. Its staff drew up the specifications and cooperated in the design of the "Universal Automatic Computer," better known as UNIVAC, the first general purpose electronic computer system, which was installed at the Census Bureau's Philadelphia Field Office in 1951 for use in processing the 1950 population census. The system was moved to the Suitland headquarters in time for the 1954 Census of Agriculture. Even with the new system, a large clerical staff was required to manually edit the individual report forms before the data were keyed to punchcards for computer processing. The 1964 Census introduced "string" punching, which saved time in key punching and computer processing. This technology reduced the total number of punchcards needed to transfer the data to magnetic tape, and used computerized programs to perform much of the editing and tabulating work. For the 1969 Census, the Census Bureau's Data Preparation Division (DPD) in Jeffersonville, IN, began keying the agriculture data directly to small magnetic tape reels, "pooling" (i.e., consolidating) the data on standard computer tape reels, and shipping the tapes to the main computer facility at Suitland, MD, for processing. High-speed printers produced copies of tables for review and correction, and even for photo-offset reproduction for publication. For the 1974 Census, computer disks replaced the small tape reels, and the Jeffersonville office transmitted the data to Suitland electronically via telephone datalink. For the 1978 Census, individual bar code address labels and laser "reading" equipment facilitated automated check-in, while in the 1982 Census the data were keyed directly to computer disk once again, but there was no clerical edit before keying, since the edit programs developed by the Census Bureau made manual editing unnecessary. The 1982 Census also saw the first use of the interactive data base system, which allowed analysts access to the entire data file to resolve problems. This system was expanded further for 1987, using minicomputer systems to edit the tabulations and to prepare the actual tables, making it possible to dispense with the paper printouts required in the earlier systems.

As a result of the transfer of the agriculture census from the Bureau of the Census to the Department of Agriculture, National Agricultural Statistics Service (NASS) in 1997, census activities were conducted by NASS's Field Offices. Specifically, collection of data on tagged records and telephone follow-ups were conducted by the respective Field Offices. In addition, each Field Office reviewed the preliminary data tabulations and the final tabulations before being published. Appropriate follow-up and corrections were made by the Field Offices. This approach allowed NASS to utilize its knowledge of local agriculture and incorporate known information into the state tabulations.

The basic structure of the data collection and processing activities for the 2002 Census of Agriculture were the same as was used for the 1997 census. NASS used the Census Bureau's data processing facility (NPC) in Jeffersonville to handle the mailout/mailback and data capture activities. However, instead of the traditional data keying entry approach for capturing census data, electronic scanning of the report forms and Optical Character Recognition (OCR) of the data was used. Scanning and OCR allowed Field Office staff and

headquarter's personnel more rapid access and ability to review reported data. Electronic access to the report forms was a significant improvement over distribution and review of the paper report forms.

Data processing, review, and resolution of data errors and inconsistencies was done by NASS's Field Offices and headquarters staffs, not NPC as was done during previous censuses. In addition, a new data analysis system was developed and used.

Publication

Census of Agriculture data were traditionally published in printed reports, containing tabulations at the national, state, or even county level (as appropriate for each report series), with occasional use of illustrations and graphics. Since the turn of the century, this conventional system was modified successively to include individual reports for each state and county, special reports on selected subjects, greatly increased use of graphics and the development of a graphics report, and the adoption of electronic and other publishing media.

The Census Bureau employed relatively simple geography for publishing census data. Until the 1987 census reports were issued, the standard area reports covered the country as a whole, census geographic regions (and occasionally census divisions), states, and counties. For the 1987 enumeration, the Census Bureau produced selected statistics at the five-digit ZIP Code level as well; this was the first time agriculture census data were published for a level below the county since the first farm enumeration. In the 1992 Census, the Census Bureau continued to publish ZIP Code level data, and also produced tabulations of selected data for congressional districts.

The early census reports sometimes included selected maps and an occasional chart, but these were very limited in scope. The Census Bureau produced the first Graphic Summary, showing farm tenure and land use, as part of the 1945 Census of Agriculture publication program, and for 1969, introduced computer generated maps as well as additional charts and graphs. Renamed the Agricultural Atlas of the United States for 1987, the graphics report became a regular and popular part of the census publication program.

The Census Bureau issued agriculture census data on computer tape – in two standard computer languages – for the first time as part of the 1964 publication program, although only tapes of the preliminary data were offered. For the 1969 and following Censuses, the Bureau of the Census provided final census data on computer tape, while preliminary data were available only on tape for the 1978 enumeration. As computer use became more widespread, data users indicated that they needed both the preliminary and final agriculture census data on computer tape, and urged the agency to expand its data publication in machine-readable format to include new media. For the 1982 Census, the Census Bureau issued preliminary and final data files on computer tape and the preliminary data on flexible diskettes as well. Conventional computer tape files were those for which the user had to have access to a mainframe computer and the necessary programming and service staffs. Flexible diskettes could be used on the rapidly proliferating mini- and microcomputer systems, although they had limited data capacity (e.g., the 1982 agriculture preliminary data file required over 100 diskettes).

For the 1987 census, the Census Bureau dropped flexible diskettes in favor of developing data files for sale on compact disc-read only memory (CD-ROM). The CD-ROM format employed rigid plastic discs virtually identical to those introduced for audio recordings, and a single read only memory disc had a data capacity comparable to four high-density computer tapes. Moreover, while special "readers" were required to use the new product, the equipment could be added to a standard mini- or even microcomputer system at minimal expense, while giving the user access to an enormous amount of data. The entire 1987 Census of Agriculture data file could be contained on a single CD-ROM disc with room to spare. The Census Bureau, after producing two test discs to evaluate the capabilities of the new medium, adopted it for future censuses and issued the final 1987 Census of Agriculture data file on a single CD-ROM. The basic state and county data for the 1992

Census of Agriculture were released on three CD-ROM's, the first containing selected data for the first 27 states processed, and the second and third, issued as a set, containing data for all states, plus the national summary data, and detailed cross-tabulations.

As was done in 1997, the 2002 Census of Agriculture publication program published data in a variety of formats – Internet, printed reports, and compact-disc read only memory (CD-ROM). The 56-part Volume 1, Geographic Area Series, state and County Data, series AC-02-A-1 to -56, included final state and county (or equivalent) detailed data for the 50 states, United States Summary, Puerto Rico, Guam, the U. S. Virgin Islands, Commonwealth of Northern Mariana Islands, and American Samoa. In addition, numerous specialty products were published.

THE FARM DEFINITION

The first official definition of what constituted a farm for census purposes was used for the 1850 census, when any place that had \$100 or more in total value of sales of agricultural products qualified. Since 1850, acreage and dollar value limits were added, altered, or removed, while a requirement evolved that the land on the place be:

- Involved in, or connected with, agricultural operations, and
- Under the day-to-day control of a single management (either by an individual, partnership, corporation, or other organization).

The important point was, of course, the involvement with agricultural operations, which--again for census purposes--were the production of livestock, poultry, and animal specialties, and their products, and/or crops, including fruit, and greenhouse and nursery products. The land did not need to be a single contiguous tract to comprise a single farm, but had to be operated as a single economic unit (although exceptions were allowed; see the section on the 1950-1954 definition following).

Changes in the various criteria used in the farm definition, by census, were:

- 1850-1860 No acreage requirement, but a minimum of \$100 in sales of agriculture products.
- 1870-1890 Any place of 3 or more acres, involved with agricultural production, qualified as a farm. Places with less than 3 acres were considered farms, if they had a minimum annual value of agricultural product sales of \$500.
- 1900 No acreage or minimum sales requirement, and cranberry marshes, greenhouses, and city dairies were included, if they required the full-time services of at least one person.
- 1910-1920 A minimum of 3 acres, with \$250 or more in total value of sales, unless the individual operation required the full-time services of at least one person.
- 1925-1945 The requirement of the full-time services of at least one person was deleted; otherwise the definition was unchanged.
- 1950-1954 Places of less than 3 acres qualified as farms if they had, or normally would have had, sales of \$150 or more in agricultural products during the census year. Places that began operating for the first time as farms in 1954 also were included. Parcels operated by sharecroppers, and tenant farms, counted as

separate farms, even though the landlord handled the entire holding as a single unit. Land retained and operated by the landlord also was counted as a separate unit.

- 1959-1974 The acreage requirement was raised to 10 acres or more, with at least \$50 or more in agricultural product sales. A place of less than 10 acres qualified as a farm if it had sales of \$250 or more during the census year.
- 1978-1992 The acreage requirement was dropped and any place that had, or normally would have had, \$1,000 or more in total agricultural product sales during the census year qualified as a farm.
- 1997 Agricultural operations with all acreage in the Conservation Reserve Program (CRP) or Wetlands Reserve Program (WRP) were included as farms in the 1997 Census tabulations. For the 1992 Census, farms that had all their acreage in the CRP or WRP were not included.
- 2002 The definition of a farm used in the 2002 Census of Agriculture was any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. As in the 1997 census, agricultural operations with all acreage in the Conservation Reserve Program (CRP) or Wetlands Reserve Program (WRP) were included as farms in the census tabulations.

Though the 2002 census collected data for multiple operators for a single farm, the concept of the principal operator or senior partner was maintained. The reporting unit for the agriculture census continued to be the individual agricultural operation, i.e., the farm or ranch.

U.S. Territory and Outlying Areas

The farm definition used for censuses of U.S. territories following the 1997 Census of Agriculture differed from the definition employed in the 50 states and generally varied between territories.

In Puerto Rico, the farm definition used in the 1998 Puerto Rico Census of Agriculture generally required 3 or more cuerdas (a cuerda equals approximately .97 acres) and/or specified numbers of livestock, poultry, or fruit or nut trees. In the 2002 Puerto Rico Census of Agriculture, the definition was based on value of sales of agricultural products during the reference period. A place qualified as a farm, for census purposes, if it had, or normally could be expected to have, \$500 or more in sales of agricultural products in the 12 months preceding January 1, 2003.

In American Samoa, due to the importance of noncommercial agriculture both economically and socially, the farm definition was broad and did not include a minimum value of sales. A farm was defined as any place that produced agricultural products for sale or consumption by family members.

The farm definition used in Guam and the CNMI was any place that had sales of agricultural products of \$1,000 or more. This is the same farm definition used in the main U.S. census.

For the U.S. Virgin Islands, the farm definition remained the same as in previous censuses, \$500 or more in agricultural sales.

Appendix C: Volume of 2002 Census of Agriculture Mailout

Table C-1. **Initial Mailout Report Forms Mailed From NPC and Tagged Report Forms Handled by Field Offices**

Report Form Type	Quantity
Total report forms	2,843,550
Report forms mailed from National Processing Center ¹ :	
Nonsample (forms 02-A0101 to 02-A0112)	2,140,421
Sample non-must (forms 02-A0201 to 02-A0212)	361,551
Must cases (forms 02-A0201 to 02-A0212)	154,303
Nonsample partnerships (forms 02-A101 to 02-A0112)	84,920
Sample partnerships (forms 02-A201 to 02-A0212)	43,087
Multi unit operations (forms 02-A201 to 02-A0212)	29,342
Sub-total	2,813,624
Tagged report forms handled by Field Offices (forms 02-A201 to 02-A0212)	30,261

¹ The Washington Field Office had responsibility for mailing the 2002 Alaska Census of Agriculture report forms and follow-up activities.

Table C-2. **Receipts and Corrected Undeliverable As Addressed (UAA) Report Form Packets**

UAAs	Mailout dates	Forms
UAAs received	NA	190,428
Total corrected UAAs mailed	NA	116,020
First mailing of corrected UAAs	January 27, 2003	71,512
Second mailing of corrected UAAs	February 27, 2003	44,508

Appendix D: Chronology of Major 2002 Census of Agriculture Program Activities

<u>Major Activities</u>	<u>Began</u>	<u>Completed</u>
2002 Census of Agriculture (United States) –		
Determination of Organization/Framework and Resources	05/98	03/01
Report Form and Related Materials Preparation and Printing:		
Forms content and design	12/99	12/01
OMB clearance	04/01	10/01
Form contract and printing	03/01	10/02
Census List Frame Development:		
Procure source lists	01/98	09/02
List production	01/98	09/02
Final list creation	09/02	09/02
Coverage Evaluation Data Collection	06/02	12/02
Mail Preparation and Mailouts:		
Mail packet preparation (Initial and follow-ups)	11/02	03/03
Initial mailout	12/02	12/02
First follow-up mailout	02/03	02/03
Second follow-up mailout	03/03	03/03
Computer Assisted Telephone Interview (CATI):		
Planning, development, and testing	10/00	04/03
Data collection	02/03	07/03
Precomputer Processing:		
Receipts (Open and Sort) and Check-in	12/02	05/03
Special case processing and “2+” processing	01/03	05/03
Problem Solving	12/02	05/03
Scanning and data capture	01/03	05/03
Computer Processing:		
Edit/item imputation	02/03	03/04
Analytical review, including final data review	03/03	05/04
Nonresponse and Coverage Evaluation	12/03	06/04
Tabulation/Publication	01/03	02/05

Major Activities – con.**Began Completed****Census of Agriculture (Outlying Areas) –****2002 Census of Agriculture – Puerto Rico:**

Negotiate special agreements	02/01	06/01
Planning and development	03/00	12/02
Data collection	12/02	05/03
Editing, tabulation, and review of data	06/03	12/03
Publication preparation	01/04	02/04

2002 Census of Agriculture – Virgin Islands:

Negotiate special agreements	05/02	10/02
Planning and development	04/00	12/02
Data collection	01/03	05/03
Editing, tabulation, and review of data	05/03	04/04
Publication preparation	04/00	01/05

2002 Census of Agriculture – Guam:

Negotiate special agreements	05/02	10/02
Planning and development	04/00	12/02
Data collection	01/03	07/03
Editing, tabulation, and review of data	07/03	03/04
Publication preparation	04/04	09/04

2002 Census of Agriculture – Northern Mariana Islands:

Negotiate special agreements	05/02	10/02
Planning and development	04/00	12/02
Data collection	01/03	04/03
Editing, tabulation, and review of data	04/03	01/04
Publication preparation	02/04	07/04

2002 Census of Agriculture – American Samoa:

Negotiate special agreements	03/03	11/03
Planning and development	03/01	12/03
Data collection	03/04	06/04
Editing, tabulation, and review of data	06/04	03/05
Publication preparation	03/05	10/05

Follow-on Surveys and Special Studies –**2003 Farm and Ranch Irrigation Survey:**

Planning and development	01/02	12/03
Data collection	01/04	05/04
Editing, tabulation, and review of data	03/04	11/04
Publication preparation	11/04	11/04

Major Activities – con.

Began Completed

Follow-on Surveys and Special Studies – con.

2005 Census of Aquaculture:

Planning and development	09/04	12/05
Data collection	12/05	02/06
Editing, tabulation, and review of data	01/06	06/06
Publication preparation	05/06	10/06

Appendix E: General Methodology and Data Changes

BACKGROUND INFORMATION

The 2002 Census of Agriculture was the first census of agriculture planned, enumerated, and reviewed entirely by the National Agricultural Statistics Service (NASS). In preparation for the census, interested organizations and agencies, including other agencies of the U.S. Departments of Commerce and Agriculture, e.g. the Bureau of Economic Analysis and the Economic Research Service, and others were regularly consulted for comments and suggestions regarding data needs. The Advisory Committee on Agricultural Statistics reviewed the proposed report forms, made suggestions and comments, and assessed external data requests. They also made their own recommendations regarding final content of the report forms and published tables. All of these recommendations, regardless of their source, were then reviewed by the NASS Content Team – a group of employees assigned to coordinate report form design suggestions.

As in past censuses, the 2002 United States Census of Agriculture program included enumerations in Puerto Rico and other outlying commonwealths and protectorates of the United States. The governments of these outlying areas and their respective data users contributed to the development of the report forms and data collection methodology. Additional details about the data and report form consultation process is contained in the respective chapters of the corresponding publications.

2002 CENSUS OF AGRICULTURE – STATES

General Methodology

The 2002 regional report forms used the same basic format, layout, and data items as the 1997 report forms. The census retained the regionalized census report forms. A total of 10 multi-state regions were used. The states of Florida, Hawaii, and Alaska were considered individual regions and a separate report form was developed for each of these states. A total of 13 regionalized report forms were developed. Texas, which was a region unto itself in 1997, was combined with New Mexico in 2002.

Two report forms were used for each region, except in Alaska – a nonsample version and a sample version. Only the sample version was used in Alaska. All of the report forms had similar formats, but employed tailored items to list crops within each region. The livestock section on the Alaska form was tailored just for Alaska. The crop sections on the Hawaii form were unique. A section to collect data on American Indian Reservation farming was unique to region 8 (Minnesota, Montana, North Dakota, and South Dakota) and region 10 (Idaho, Oregon, and Washington) report forms.

The nonsample report forms contained the items asked of all respondents, while the sample versions included additional questions asked only of the sample of farmers. Unlike 1997, in 2002, the Farm-Related Income section was asked of all respondents. This change was made because farm-related income data did not sample well. In addition, a separate report form was designed and used for the Citrus Caretakers census.

A screening activity called the Farm Identification Survey (FIS) was conducted for selected records on the List Frame to determine the farm status. The main purpose was to eliminate non-farm records from the list and

reduce the CML and the associated costs of the 2002 Census of Agriculture. The FIS report form was designed to identify non-farms from possible farms.

There were two FIS samples in 2002. One sample was mailed on April 17, 2001 with a nonresponse follow-up mailing May 15 through May 18. The second sample was mailed July 18 through July 24, 2001. The second sample did not have a follow-up mailing for nonresponse. The April sample had 591,288 records of which 150,038 were out-of-scope with no future sales indication. The July sample had 568,692 records of which 117,229 were out-of-scope with no future sales indication.

Major Content Changes

The data collected, to a large extent, were comparable between the 2002 and 1997 Censuses. The bulk of the data collected on agricultural operations focused on basic information on acreage in farmland and various crops, inventories of livestock, value of sales of agricultural products, and so on. Specific data requirements and priorities change over time, and the content of the report forms was adjusted to reflect these changes. Farms with all acreage in the Conservation Reserve Program (CRP) or the Wetlands Reserve Program (WRP) were included in the census tabulations.

Content changes resulted from new items needed by and data items no longer required by data users. Some of the other changes were the result of efforts to make census data more compatible with data items on NASS surveys. Some of the new data items were added to collect information on emerging agricultural products and practices.

Several production-related items were deleted, including production of fruits, nuts, and berries; number of bearing and nonbearing age trees or vines; litters of hogs farrowed; number of hogs sold for slaughter; number of sheep and lambs shorn; and pounds of wool shorn. Deleted sales items were gross value of sales for cattle fattened on grain or concentrates, feeder pigs sold, and value of individual nursery items.

Two significant data additions, collected for the first time in 2002, were: 1) multiple operator characteristic data on the second and third operators, and 2) new economic data. These two new items enhanced the amount of data available from the census.

For the first time, selected information was collected for up to three operators on each farm. For those operators who would self-identify as being of multiple races, a “more than one race” category was added to better represent those individuals. Prior to 2002, race data were always collected under the presumption that an operator could be of only one race. In 2002, the total count of all operators and the number of those who were female was collected from all farms. Detailed operator characteristic data were collected from a maximum of three operators per farm.

New economic data were collected to provide a more complete picture of farm income and expenses. Questions relating to net cash income of the operator and the operation, crop insurance, landlord share of income and expenses, grain storage, and organic farming were added to the report form. Questions relating to computer use and Internet access on the farm, and if the principal operator worked as a hired manager of the operation were also added. In addition to the amount of commodities delivered under a production contract, the amount the contract grower received from the integrator or contractor was collected for the first time.

Changes by report form section were:

- **Section 2 Land** – Land Use was the second section of the report form and was asked before individual crops. Crop insurance and irrigation were also collected in this section.

- **Section 3 Crops** – New questions for hay total surface acres and total surface acres irrigated were added. This allowed the exact acreage of land that was cut as both dry and green hay to be calculated. The number of maple taps and gallons of syrup produced were asked as separate questions.
- **Section 4 Grain storage capacity** – Grain storage was asked for the first time since 1969.
- **Section 5 Nursery, greenhouse, floriculture, sod, mushrooms, and vegetable seeds** – Flower seeds and vegetables seeds were asked separately.
- **Section 6 Vegetables and melons** – Vegetable acres harvested for processing were collected by type of vegetable. Irrigated acres by type of vegetable was not collected but data collection of total irrigated vegetable acres continued.
- **Section 7 Fruits and nuts** – Bearing age and nonbearing age tree counts were replaced by bearing age and nonbearing age tenths of acres. Quantity harvested by tree type was not collected. Oranges were broken out into Valencia oranges and oranges other than Valencia. Peaches were broken out into Freestone and Clingstone in selected states.
- **Section 8 Berries** – Total berry acres and total berry acres irrigated were collected. However, berry quantity harvested by crop and acres irrigated by type of berry were not collected.
- **Section 9 Hogs and pigs** – Type of operation and type of producer was collected. The number of litters farrowed and the number of hogs sold for further feeding was not collected.
- **Section 10 Cattle and calves** – The inventory of cattle on feed was collected. The inventory of heifers, steers, bulls, and bull calves was not asked separately but was collected as a single item called other cattle.
- **Section 11 Poultry** – Turkeys data were collected as a unit. Turkey hens for breeding and turkeys for slaughter breakouts were not collected. Emus and ostriches were asked as individual poultry items for both their inventory and sales. Incubator egg capacity was not collected.
- **Section 12 Other animals and their products and aquaculture** – Sheep and bees were collected only if owned by the operation.
- **Section 14 Value of sales** – Potatoes and sweet potatoes were collected with the sales of vegetables and melons. In 1997, sales data were collected with Other crops. All farm products sold were collected in a single section, instead of collecting crop sales in a separate section and livestock sales in the section of the particular species. The landlord's share of total sales was collected, as was the dollar amount of certified organically produced commodities. The operator was not asked to list the value of goods grown under a production contract.
- **Section 16 Income from farm-related sources** – The value of patronage dividends and refunds from cooperatives was asked separately. Previously this amount was part of All other farm-related income. Recreational income was collected as a separate item. Previously this amount was part of All other farm related income.
- **Section 17 Production expenses** – Livestock purchased was broken out into Breeding livestock and Other livestock and poultry. Motor fuels were collapsed into a single category. Electricity was expanded to

include all farm utilities. Customwork, machine hire, and the rental of machinery and equipment was combined into customwork and custom hauling. Rent and lease expense for machinery and equipment became a separate item. Expenses paid by landlords and depreciation were added as new items.

- **Section 18 Fertilizer and chemicals applied** – Acres treated with manure was added as a new item.
- **Section 19 Machinery and equipment** – Mower conditioners were deleted and self-propelled field forage harvesters were added to the list of specified items.
- **Section 21 Farm labor** – A yes/no question regarding the use of migrant workers was added.
- **Section 22 Type of organization** – Partnerships were asked if they were registered under state law.
- **Section 23 Agricultural activity on American Indian Reservations** – This new section was added in several states to determine how much agricultural activity was on Reservations that was not conducted by the Reservation itself.
- **Section 24 Operator characteristics** – The demographic characteristics were expanded to get detail data for up to three operators per farm and to collect the total number of female operators. The number of households that shared in an operation's income as well as the percent of total household income of the principal operator that was derived from the operation were added.

2002 CENSUS OF AGRICULTURE – PUERTO RICO

General Methodology

The 2002 Puerto Rico Census of Agriculture was conducted by mailing report forms to farm operators on the census mail list. This mail list was supplemented by an area sample survey. The area sample identified farms not accounted for on the mail list. This multiple frame approach resulted in complete coverage. Only a single version of the report form was used.

Major Content Changes

Based on feedback from data users in Puerto Rico, the following changes were made to the 2002 report form:

- Vegetables or melons section – Hydroponic crops harvested for sale and area and quantity harvested were added.
- Nursery, greenhouse, and floriculture section – Palm trees and poinsettias were added.
- Production expenses section – Cost of machinery and building maintenance were added.
- Machinery, equipment, and buildings section – Buildings used as greenhouses was added.

2002 CENSUS OF AGRICULTURE – COMMONWEALTH OF NORTHERN MARIANA ISLANDS

General Methodology

The same method of data collection was used for the 2002 Census as for the 1998 Census. This was the second agricultural census conducted as part of the five-year cycle used for the main U.S. census of agriculture. The

reference period for the 2002 and the 1998 Censuses of Agriculture in the Commonwealth of Northern Mariana Islands was the calendar year, January 1 through December 31, 2002.

Major Content Changes

There were no significant changes to the content of the report forms between the 1998 and 2002 Censuses. The 2002 report form included all the same items as the 1998 report form.

2002 CENSUS OF AGRICULTURE – GUAM

General Methodology

The same method of data collection was used for the 2002 Census as for the previous census. However, the reference period changed from the 12-month period between July 1, 1997 and June 30, 1998 to the calendar year, January 1 through December 31, 2002. The statistics collected in the 2002 Census relate to places with agricultural operations qualifying as farm operations according to the census definition, that is, all places from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during 2002.

Major Content Changes

There were no changes to the content of the report forms between the 1998 and 2002 Censuses

2002 CENSUS OF AGRICULTURE – VIRGIN ISLANDS

General Methodology

The same method of data collection was used for the 2002 Census as for the 1998 Census. However, the reference period changed from the 12-month period between July 1, 1997 and June 30, 1998 to the calendar year, January 1 through December 31, 2002. The statistics collected in the 2002 Census relate to places with agricultural operations qualifying as farm operations according to the census definition, that is, all places from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during 2002.

Major Content Changes

There were no significant changes to the content of the report forms between the 1998 and 2002 Censuses. The 2002 report form included all the same items as the 1997 report form.

2003 CENSUS OF AGRICULTURE – AMERICAN SAMOA

General Methodology

The method of data collection and the type of data collected for 2003 were the same as for the previous census. This was the tenth census of agriculture of American Samoa but only the second conducted strictly as a census of agriculture. Statistics collected for American Samoa represented all households with agricultural activities during the 2003 calendar year. The farm definition is any place that raised or produced any agricultural product for sale or home consumption. This reflects the importance of subsistence agriculture both economically and socially in American Samoa.

Major Content Changes

There were no significant changes to the content of the report forms between the censuses. There were some changes in the published tables, including the addition of selected expenses and the elimination of county-level data on sources of financing for agricultural activities.

2003 FARM AND RANCH IRRIGATION SURVEY (FRIS)

General Methodology

The basic method of data collection involved mail respondents and field and telephone follow-up. The type of data collected for the 2003 FRIS was primarily the same as for the 1998 FRIS. The 2003 FRIS also utilized the resources of NASS's 45 Field Offices. This provided expanded opportunities for telephone follow-up and/or personal enumeration of nonresponse cases. However, centralized processing was conducted at the National Processing Center (NPC) to clean up the data. Computerized scanned images of each completed FRIS report form was used for the first time. This was the second FRIS to collect and publish data for each of the 50 states. Prior to 1998, farm and ranch irrigation surveys published data for only leading irrigation states with a U.S. total, excluding Alaska and Hawaii. The current farm definition, first used in 1974, is any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.

Major Content Changes

Significant changes made to the 2003 report form included:

- **Land use section** – New question that asked for county with largest irrigated acreage was added.
- **Method of water distribution section** – Poly-tubing was asked separately from above ground pipe and drip or trickle irrigation was separated into 3 types.
- **Estimated quantity of water used section** – A column was added for off-farm surface water and a new option for reporting total acre feet was added.
- **Water transfers** – This was a new section and it included three new questions for source and quantity of water transferred.
- **Expenditures for irrigation facilities section** – A new column was added to collect source of funding assistance.
- **Primary method of water distribution and chemical application section** – This page was totally revamped. Two columns were added to collect type of irrigation system and percent of crop irrigated by system. Two columns for acres of chemicals and fertilizer applied were added. Three columns that asked number of times crops were irrigated were removed.
- **Number of irrigation wells, depth, and pumping capacity section** – Two columns were added that asked for engine HP and the total hours operated question was removed.
- **Energy used on this operation for pumping irrigation water section** – A new column was added by splitting acres irrigated by type of energy into two categories: 1) acres using water from wells, and 2) acres using surface water.

- **Irrigation labor section** – This was a new section in 2003.
- **Farm sales section** – This was a new section with three questions as follows: 1) value of total farm sales, 2) percent of total farm sales from irrigated crops, and 3) percent of total farm sales from livestock sales.

2005 CENSUS OF AQUACULTURE

General Methodology

The 2005 Census of Aquaculture was the second census conducted for the industry. The respondent universe consisted of all operations identified in the 2002 Census of Agriculture with sales of aquaculture products. The mail list also included aquaculture operations identified during a national list building effort in 2005. Data collected in the 2005 Census of Aquaculture was primarily the same as in the 1998 census. Methods of data collection included mail, field interviews, and telephone calls. Resources from NASS's 45 Field Offices were utilized from mailout to publication. Field Offices increased response rates by phoning and/or conducting personal interviews with respondents who failed to return the report form by mail. In addition, Field Offices edited and reviewed data prior to the national review performed by headquarters staff. As a quality control measure, images of all completed report forms were created at the National Processing Center. Data were published at the State and U.S. levels.

Major Content Changes

Several changes were made to the 2005 report form based on lessons learned from the first aquaculture census conducted in 1998. The primary focus was on improving the quality of sales data collected. More than 50 specific aquaculture species were pre-listed to avoid confusion. This compared to less than 25 specific species that were pre-listed on the 1998 report form. Additional sections were added with questions tailored to specific sectors of the aquaculture industry. Questions were designed so that all reported sales information could be converted and published in one standard unit, regardless of how the data were originally reported. For most of the species listed in the 2005 publication, the number sold, pounds sold, and total dollars received were published.

Other changes included: additional versions of the report form were created to correspond with aquaculture production in specific states, the production methods list was expanded, an organically raised aquaculture question and a farm employment section were added, and the cooperative agreements and contracts section and the estimated value of products distributed question were removed.

Appendix F: Abbreviations

ACES	Agricultural Coverage Evaluation Survey
ADC	Automated Data Capture
ADVFU	Advance Follow-up
AELOS	Agricultural Economics and Land Ownership Survey
AGFS	Agriculture and Financial Statistics Division
AHS	Annual Housing Survey
AIS	Agriculture Identification Survey
APHIS	Animal and Plant Health Inspection Service
ARMS	Agricultural Resources Management Study
ASCS	Agricultural Stabilization and Conservation Service
ATAC	Automated Tracking and Control System
BLS	Bureau of Labor Statistics
BOC	Bureau of the Census
CAAS	Census of Agriculture Area Sample
CART	Classification and Regression Tree
CATI	Computer-Assisted Telephone Interview
CATS	Census of Agriculture Tracking System
CD-ROM	Compact Disc-Read Only Memory
CES	Classification Error Survey
CFI	Correct From Image
CITC	Content Test Incoming Telephone Call
CML	Census Mail List
CNMI	Commonwealth of Northern Mariana Islands
CPAS	Census Program Administration Section
CPB	Census Planning Branch
CRP	Conservation Reserve Program
CSREES	Cooperative, State, Research, Education, and Extension Service
DKWU	Data Keying Workunit
DOC	Department of Commerce
DSB	Data Systems Branch
DUP	Duplicate
ELMO	Enhanced List Maintenance Operations
EQIP	Environmental Quality Incentives Program
ERS	Economic Research Service
ES	Extension Service
FAS	Fall Area Survey
FRIS	Farm and Ranch Irrigation Survey

FSA	Farm Service Agency
FVSCS	Fruits, Vegetables, and Special Crops Section (Statistics Division, NASS)
FY	Fiscal Year (October - September)
GPO	Government Printing Office
ICO	Incorrectly Classified (Overcount)
ICR	Intelligent Character Recognition
ICU	Incorrectly Classified (Undercount)
ID	Identification
IE	Interactive Edit (Blaise)
IRS	Internal Revenue Service
I/S	In-scope (Meets the census definition of a farm)
ITC	Incoming Telephone Call System
JAS	June Agricultural Survey
LACS	Locatable Address Conversion System
LAN	Local Area Network
LFCU	Large Farm Coverage Unit
LRC	Low Response County Follow-up
LSFID	List Survey Frame Identification
LSF	List Sampling Frame
MISO	Marketing and Information Services Office
NAICS	North American Industry Classification System
NASDA	National Association of State Departments of Agriculture
NASS	National Agricultural Statistics Service
NCOA	National Change of Address
NITC	National Information Technology Center (USDA)
NML	Not-on-the-Mail List
NPC	National Processing Center (Bureau of the Census)
NR	Non-response
NRCS	Natural Resources and Conservation Service
NRS	Non-response Survey
OCR	Optical Character Recognition
OMR	Optical Mark Recognition
O/S	Out-of-Scope (Not meet census definition of a farm)
PD	Possible Duplicate
PDF	Portable Document Format
PES	Post Enumeration Survey
POID	Person Operator Identification
PPC	Possible Partnership or Corporation
PRDA	Puerto Rico Department of Agriculture
PRL	Probabilistic Record Linkage
PSA	Public Service Announcement

PSU	Primary Sampling Unit
PTO	Power Take-off
QC	Quality Control
REE	Research, Education, and Economics
RFO	Resident Farm Operator
ROC	Respondent Originated Correspondence
SAS	Statistical Analysis System
SMS	Survey Management System
SRS	Statistical Research Service
SSN	Social Security Number
TVP	Total Value of Product
UAA	Undeliverable As Addressed
UAT	User Acceptance Test
UPR-ES	University of Puerto Rico - Extension Service
USDA	U.S. Department of Agriculture
USVI	U.S. Virgin Islands
VNR	Video New Releases
WRA	Water Resources Area
WRP	Wetlands Reserve Program

Publication Program

2002 CENSUS OF AGRICULTURE

Results of the 2002 Census of Agriculture are published in a series of reports that provide data at the national, State, and county (or equivalent) levels for the United States. Data also are available for Puerto Rico, American Samoa, Northern Mariana Islands, Guam, and the U.S. Virgin Islands of the United States.

VOLUME 1. GEOGRAPHIC AREA SERIES (AC-02-A-1 to 51)

National, State, and county data are published in detailed national and State tables for the United States, and in State and county tables for each State. These reports include data on number and size of farm; crop production; livestock, poultry, and their products; tenure, age, and principal occupation of operator; type of organization; value of products sold; government payments plus market value of agricultural products sold; production expenses, direct marketing; landlord expenses; computer use; production contracts, fertilizers and chemicals; machinery and equipment; farm labor and migrant workers, value of land and buildings; agricultural activity on American Indian reservations; grain storage capacity; land use; irrigation, and the North American Industry Classification System.

U.S. Summary and State Report (AC-02-A-51)

- Chapter 1. National-level data
- Chapter 2. State-level data

State and County Reports (AC-02-A-1 to 50)

- Chapter 1. State-level data
- Chapter 2. County-level data

Outlying Areas Data (AC-02-A-52 to 56) are published for the municipios of Puerto Rico, the election districts on Guam, the municipalities of the Commonwealth of the Northern Mariana Islands, the districts and counties of American Samoa, and the islands of U.S. Virgin Islands.

Speciality Products - Data from the census are extracted and presented in several different product formats. They are State and County Highlights, County Profiles, American Indian and Alaska Native, and Top Commodities.

VOLUME 2. SUBJECT SERIES (AC-02-S-1 to 5)

Agricultural Atlas of the United States (AC-02-S-1) graphically illustrates a profile of the Nation's agriculture at the county-level in a series of multicolor pattern and dot maps.

Congressional District Ranking (AC-02-S-2) provides selected statistics from the 2002 Census of Agriculture ranked by

congressional districts. The statistics include: operator characteristics, farm characteristics, selected livestock, and selected crops harvested.

ZIP Code Tabulations of Selected Items (AC-02-S-3) provides tabulations by ZIP Code for the total market value of products sold; number of farms by size; land in farms; inventory of cattle, calves, hogs, and pigs; cropland harvested; and selected crops from the 2002 census.

Congressional District Tabulations (AC-02-S-4) provides data by congressional district. The tables show the total market value of products sold and the number of farms by size; land in farms; inventory of cattle; calves, hogs, and pigs; cropland harvested; and selected crops.

History (AC-02-S-5) provides a detailed description of the planning and conduct of the 2002 Census of Agriculture. It explains the history of the agriculture census, farm definition, data collection and processing, data dissemination and research.

VOLUME 3. SPECIAL STUDIES (AC-02-SP-1 to 2)

2003 Farm and Ranch Irrigation Survey

(AC-02-SP-1) provides data collected from a sample of irrigated farm operations in the 2002 Census of Agriculture at the national and State levels.

2005 Census of Aquaculture (AC-02-SP-2) provides statistics about the Nation's aquaculture production and structure of the aquaculture industry at the national, regional, and State levels.

PRINTED REPORTS

All of the reports listed above are available as printed reports, except Specialty Products for State and County Highlights, County Profiles, and Top Commodities and Volume 2, ZIP Code Tabulations of Selected Items (Part 3) and Congressional District Tabulations (Part 4).

ELECTRONIC PRODUCTS

Internet - Data from Volume 1, Volume 2, and Volume 3 are available online at the NASS Web site at www.nass.usda.gov. Quick STATS (an online statistical database on the NASS Web site) are available for Volume 1, at the National, State and county-level and for municipios in Puerto Rico.

CD-ROM - Manipulable data files from Volume 1, Part 1-52 are available.

For additional information, write the Customer Services Office, National Agricultural Statistics Service, USDA, Room 5038, South Building, 1400 Independence Avenue, SW, Washington, DC 20250-2000 or call 800-727-9540.