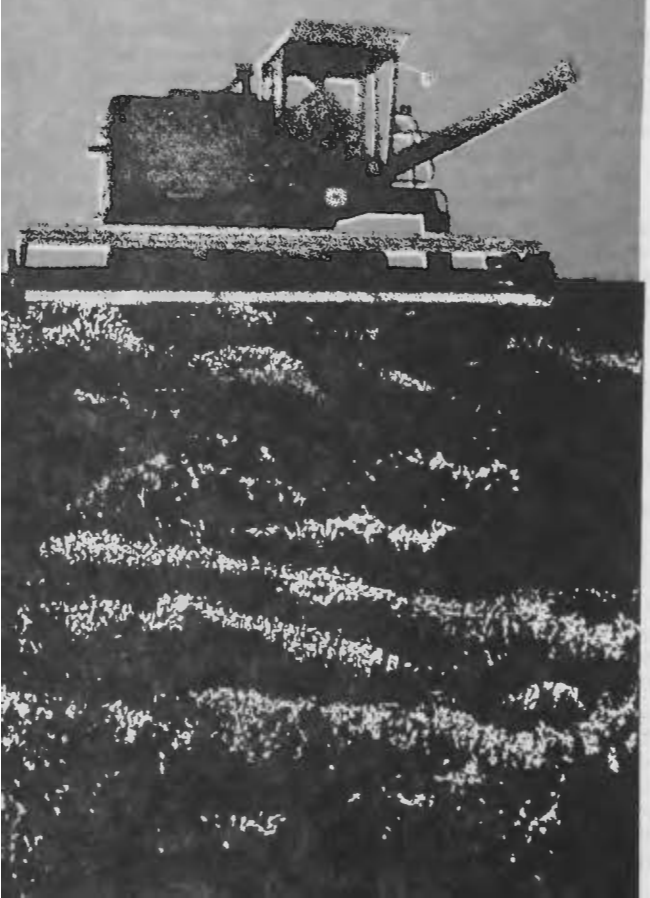
1974 Census of Agriculture

U.S. Department of Commerce
BUREAU OF THE CENSUS

Volume IV
Special Reports

Part 3
Coverage Evaluation

1974 Census of Agriculture



Volume IV

Special Reports

Part 3

Coverage Evaluation

Issued November 1978

U.S. Department of Commerce
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Primary direction was by **Shirley Kallek**, associate Director for Economic Fields. Her predecessor, **James W. Turbitt**, now Associate Director for Administration and Field Operations, directed the early stages of planning for the census. Technical direction and guidance was provided by **Harold Nisselson**, Associate Director for Statistical Standards and Methodology.

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The coverage evaluation program was conducted under the direction of **J. Thomas Breen**, Chief (to February 1976), **Orvin L. Wilhite**, his successor, and **Charles E. Rogers**, Assistant Chief of Research and Methodology, Agriculture Division.

The planning, processing, analyses, and tabulation of the statistics were performed under the supervision of **D. Dean Prochaska**, Chief of the Program Research and Development Branch, Agriculture Division. **Jane Y. Dea** was responsible for the overall planning and coordination of the various phases. Other persons providing major assistance in the processing, analyses, and tabulation phases were **Dorothy Blackistone, Janis Byrd, William Davie, James Joerger, Diane Kenney, Diana Marz, Esther Stanback, Melody Wedge**, and **Antoinette Wooten**.

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REPORTS OF 1974 CENSUS OF AGRICULTURE

Preliminary Reports. Four pages of data published separately for each county having 10 farms or more, and for each State, the four geographic regions, and the United States. *The statistics printed in these reports are superseded by those in the final reports, Volumes I through IV.*

Volume I. State and County Data. One for each State, the United States, Puerto Rico, Guam, and the Virgin Islands, covering the area and its subdivisions. The reports for the States contain data for all farms and farms with sales of $2,500 and over. *Chapter I* contains detailed data at the State level classified by size of farm, tenure and age of farm operator, type of organization, value of products sold, and major type of farm; *Chapter II,* county data summarized by subject; *Chapter III,* county data by subject for miscellaneous crop and livestock items found in relatively few counties; *Chapter IV,* county data by county.

Volume II. Statistics by Subject. Nine parts containing data for the United States, geographic regions and divisions, and States, for all farms and farms with sales of $2,500 and over.

Volume III. Agricultural Services. Data by county for each State covering establishments whose primary activities are providing agricultural services. Data at the U.S., State, and county levels for all establishments are presented for selected four-digit standard industrial classification codes by size and type of organization. Data shown include dollar volume of business, gross receipts from products provided, gross receipts, labor and payroll by type of service performed, capital expenditures, and expenditures for electricity, gasoline, petroleum, and other fuels.

Volume IV. Special Reports.
Part 1. Graphic Summary. Profiles the Nation's agricultural system in a series of U.S. maps, a number of which are printed in color. The characteristics of America's farms in 1974 are illustrated for crops, livestock, and many other characteristics.

Part 2. Ranking Counties and States. Reports on the top ranking 100 counties and 10 States in descending order of importance for 88 selected items for 1974 with comparative data for 1969.

Part 3. Coverage Evaluation. Shows the completeness of the agriculture census for States, geographic divisions, and the United States. Data also show the characteristics of farms missed by value of sales and by selected standard industrial (type-of-farm) classifications. Sampling reliability of the estimate of coverage is shown by value of sales classifications.

Part 4. Procedural History. A comprehensive summary of the procedures used in conducting the 1974 Census of Agriculture in the 50 States, Puerto Rico, Guam, and the Virgin Islands. The history explains the procedures used from early planning and testing through tabulation and publication of the final reports.

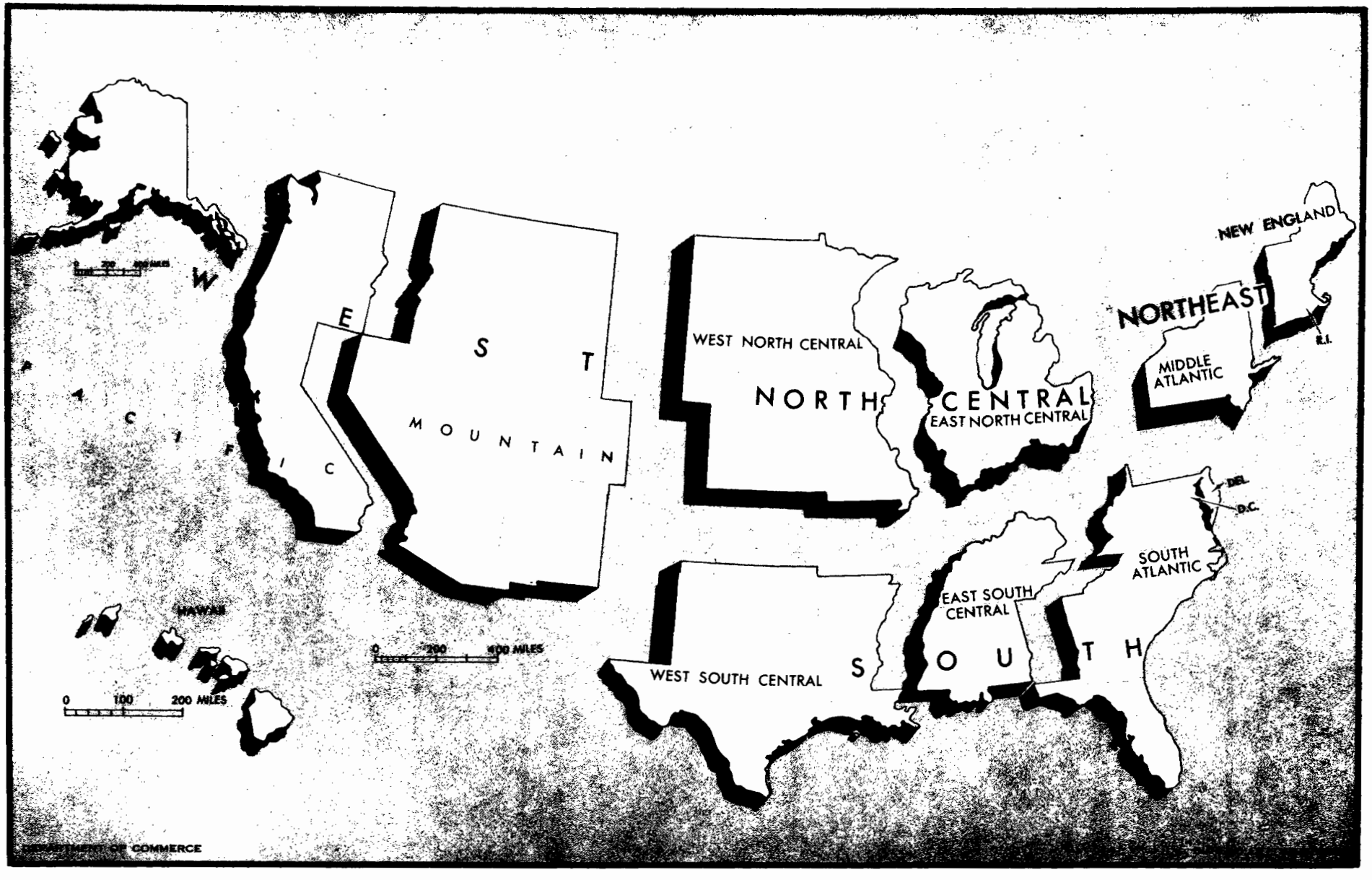
Part 5. Corporations in Agricultural Production. Presents U.S. and selected State data on farm production characteristics and nonfarm business activities for corporations reporting agricultural operations, including the proportions of business receipts from farm, farm-related, and nonfarm-related business activities. Where appropriate, production characteristics are related to corporate characteristics.

Part 6. Partnerships in Agricultural Production. Reports in depth on characteristics of farm partnerships for 1976 for the United States, with selected data for States. The survey data are based on a sample of partnerships selected from the 1974 Census of Agriculture. Where appropriate, related characteristics reported in the 1974 census are shown. The report has been prepared in cooperation with Economic Statistics and Cooperative Service, U.S. Department of Agriculture.

Part 7. Agricultural Production and Marketing Contracts. Presents detailed information on eight commodities produced and/or marketed under production and marketing contracts in 1977: Feeder and stocker cattle, fattened cattle, feeder pigs, slaughter hogs, broilers, layers, tomatoes, and potatoes. Data are presented for groups of States comprising areas of concentration, based on samples of farms reporting contracts in the 1974 Census of Agriculture. The report has been prepared in cooperation with the Economic Statistics and Cooperative Service, U.S. Department of Agriculture.

CONTENTS

REGIONS AND DIVISIONS OF THE UNITED STATES



INTRODUCTION

Authority, Area Covered, and History

The 1974 Census of Agriculture was taken in accordance with the provisions of title 13, United States Code, reaffirmed by section 818 of the Agriculture and Consumer Protection Act of 1973 (Public Law 93-86). Sections 142(a) and 191 of title 13 provide for a census of agriculture every 5 years in each State, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands. The 1974 census is the 20th nationwide census of agriculture and the second conducted primarily by mail.

Purpose of Census Coverage Evaluation

A complete and fully accurate count of farms, farmland, and farm production, is the goal of each nationwide census of agriculture. However, the many complexities involved in taking a census make this goal difficult to achieve. The method of enumeration, the variety of arrangements under which farms are operated, the difficulty in identifying some farms, and the operator's interpretation of his agricultural operation as opposed to the census interpretation are among the many problems which arise. The Bureau of the Census, therefore, attempts to measure the accuracy and completeness of its statistics for all censuses of agriculture through a coverage check evaluation program. This program provides important information needed to identify problem areas and a basis for developing improvements. It also serves as an important means of informing the users of agriculture census data of any known deficiencies which might affect their use of the data.

Previous Coverage Evaluation Programs

An evaluation of coverage has been conducted for each census of agriculture since 1945. The basic procedures have remained the same, but techniques have been refined and sample design improved with each census. The basic procedures are:

1. Selection of an area probability sample and canvass of all farms associated with each area segment to establish a measurement base or standard.
2. Match of all farms in the base sample, case by case, to the census reports and lists to establish the relationship of the census to the base sample units.
3. Follow-up to check and clarify differences and establish true values.
4. Processing, tabulation, analysis, and publication of results.

The use of an area sample as a measurement standard was justified on the basis of higher quality results obtained through more intensive enumeration and processing of the sample farms than is possible for all farms in a nationwide census. Throughout the years, several procedural modifications resulting from coverage evaluation findings have been introduced into various censuses. Prior to 1950, each census enumerator was given the definition of a farm and instructed to enumerate any place that conformed to this definition. Beginning in 1950, the enumerator was instructed to obtain questionnaires on all places with specific types of agricultural operations in an effort to improve the coverage of marginal operations which, according to the 1945 evaluation study, had accounted for a large proportion of the missed farms.

In the 1954 census, two new enumeration aids were introduced. A Township Sketch form was used in selected counties to improve coverage of nonresident operators. Enumerators in these counties were required to draw the boundaries of each farm and each nonfarm tract on the township sketch. In addition, the use of a listing book for each enumeration district was introduced to record the location and identification of every dwelling with agricultural operations and every place with no dwelling but where agriculture operations were performed. These two operations were introduced in an attempt to further decrease the number of missed farms.

However, the 1964 census evaluation program showed a continuing problem in undercoverage of small farms. Although these farms contributed little to the total farm production, their understatement was a relatively large factor contributing to the inaccuracy in the count of farms. A study[1] using materials from the 1964 coverage evaluation indicated that at least equal and perhaps better coverage could be achieved by mailing census questionnaires to lists of potential farm operators. The results were a key factor in the decision to switch to the mailout/mailback approach used for the first time in the 1969 census.

[1] A brief description of the EPA-IRS match study is presented in the 1964 Evaluation Surveys publication, chapter 1, section VIII.

Measurement Errors

The error in a statistic is the difference between the statistic and its true value. True values are assumed, therefore, in practice target values or estimates of true values which were obtained by current measurement methods are used.

It is useful to consider the measurement errors in a census conceptually in two components—response variance and bias. To do this, it is necessary to assume that the census is a repeatable process of measurement; i.e., that independent census enumerations could be carried out with certain conditions held constant, such as the form of the questionnaire and the written instructions. Certain other conditions, such as the particular persons selected as enumerators and the time of day a particular farm operator is interviewed, remain subject to random fluctuations.[1]

For most national and regional statistics, the error due to response variance is probably insignificant in comparison to the bias. The response variance arises from factors which tend to average out through compensating errors when large numbers of enumerators and/or respondents are involved, whereas the bias, although it may differ considerably for different areas of different censuses, is essentially independent of the size of the population. For smaller areas, such as counties and townships, however, response variance may be a significant source of error.

The above definitions are appropriate for census items for which data are collected from all farms. If some items are collected on a sample basis, sampling variability must also be considered along with other components of errors.

Abbreviations and Symbols

The following symbols are used throughout the tables:

– Represents zero.
Z Less than half of the unit reported.

[1] In practice, independent repetitions can not be realized; however, the model can reasonably approximate actual census conditions.

GENERAL EXPLANATION

The 1974 Census of Agriculture

Historical Background

This brief description is presented to provide background for the coverage check evaluation. A more detailed description is presented in the 1974 Census of Agriculture, volume II, part 1.

The 1974 Census of Agriculture was the 20th enumeration of U.S. Agriculture and the second to be conducted primarily by mail. The first nationwide census of agriculture was taken in 1840 as part of the sixth decennial census of population. From 1840 to 1920, an agriculture census was taken every 10 years, in connection with the decennial population census. Beginning in 1925, the first mid-decade agriculture census was taken. Production and sales data traditionally have been collected for the calendar years ending in 4 and 9. Inventory data have sometimes been collected as of a specified census date and sometimes for the date of enumeration. For all censuses prior to 1969, enumerators canvassed all rural areas to collect the data. Beginning with the 1950 census, farmers received the report forms in the mail prior to enumeration and were urged to complete them before the enumerator's arrival. Between 1964 and 1969, the decision was made to rely entirely on self-enumeration. Following adoption of this major change in data collection procedures, report forms were mailed to farmers at the end of the 1969 and 1974 reference years. Farm and ranch operators were asked to report inventory data as of December 31 and production and sales data for the calendar year.

Objectives of Coverage Check

The basic purposes of the coverage check for the 1974 Census of Agriculture have been the same as for previous censuses. However, to determine the effectiveness of new procedures, some specific objectives were added and others were altered in developing the final objectives. The 1974 coverage evaluation program was planned to:

1. Provide national, regional, and State measures of the accuracy of the census farm counts and of a limited number of items, such as land in farms and value of farm sales.
2. Provide information on factors associated with census error which may affect the user's interpretation and utilization of the data.
3. Evaluate the contribution of each administrative source list used to construct the census mailing list including the contribution of different source lists to the number of census farms, the evaluation of the accuracy of the source size indicators, and the extent of the duplication between the various source lists.
4. Evaluate the effectiveness of the record linkage system and identify areas where record duplication remained.
5. Provide estimates for selected items indicating the characteristics of farms not included in the census.
6. Identify other problem areas in order to improve coverage in future censuses.

Farm Definition

From the first agriculture census, it has been necessary to specify some minimum limits for the counting of tracts of land as farms. As the Nation has developed and grown, agriculture also has developed and grown, and from time to time the minimum criteria for the definition of a farm has been changed. The last two changes in the criteria for the definition of a farm occurred in 1959 and 1974.

In the 1959 Census of Agriculture, the definition of a farm was based primarily on a combination of acres in the place and value of agricultural products sold. The word "place" was defined to include all land on which agricultural operations were conducted at any time in the census year under the day-to-day control or supervision of one person or partnership. Control may have been exercised through ownership or management or through a lease, rental, or cropping arrangement. Publications for the 1959 through 1969 Agriculture Censuses included as farms, places of less than 10 acres if the estimated sales of agricultural products for the year amounted to at least $250. Places of 10 acres or more were counted as farms if the estimated sales of agricultural products for the year amounted to at least $50. Places having less than the $50 or $250 minimum estimated sales in the census year were also counted as farms if they could normally be expected to produce agricultural products in sufficient quantity to meet the requirements of the definition.

In view of increases in price levels and other changes in the structure of agricultural operations, various individuals and organizations, including members of

the Census Advisory Committee on Agriculture Statistics, the Office of Management and Budget, and the U.S. Department of Agriculture (USDA), agreed that further change in the definition of a farm was warranted. With Office of Management and Budget concurrence, the USDA and Commerce announced in simultaneous press releases on August 12, 1975, that the census definition of a farm, for purposes of publishing the 1974 census data, was any establishment which during the census year had or normally would have had agricultural sales products of $1,000 or more.

The 1974 definition differs from the earlier definition in two respects:

1. The criterion for number of acres in the "place" has been deleted.
2. The criterion for minimum value of agricultural products sold has been changed to $1,000.

Coverage check data are presented in table 15 using the previous census definition to show the effects of the change.

Mailing List

The initial step in conducting the 1974 census was the development of a mailing list of names and addresses of persons and organizations associated with agriculture. The primary list used was the Internal Revenue Service (IRS) (form 1040F) file of persons with farm income in 1973. Other lists used include the IRS file of farm-related business (form 1040C), the IRS farm partnership file (form 1065), the IRS file of small farm corporations (form 1120S), the Social Security file of farm employers (form 943), the Agriculture Stabilization and Conservation Services (ASCS) producers file, the 1969 Agriculture Census list of farms, selected names indicating agriculture from the economic census lists, and lists of large or specialized operations from trade associations or similar organizations. The units contained on all lists were indicated as being associated with agriculture; however, in many instances it was not possible to predetermine whether these units qualified as census farms.

Since a name could appear on more than one source list, a two-phase computerized record linkage operation was performed. First, all records were merged and unduplicated on social security and/or employer identification numbers. The second phase involved a record linkage procedure which was based on an alphabetic match of recoded first and last names and selected address characters within a 5-digit ZIP code area. The record linkage and unduplication operation reduced the initial mailing list of about 12.4 million names to approximately 5.3 million names. The final mailing list of about 4.1 million names came about as a result of the sampling of names that were indicated as being only on the ASCS source list. Names appearing only on the ASCS source list were randomly sampled at a rate varying by State from 10 percent to 100 percent and only those drawn in the sample were asked to complete census report forms. Each of the 4.1 million names on the final mailing list were assigned a measure of size used to identify units for special handling in the followup and processing stages.

Data Collection

Two basic census report forms were used in 1974. A regular 18-page report form was mailed to farm operators whose sales of agricultural products were expected to total $2,500 or more. A shorter 6-page report form was sent to farm operators whose sales were expected to total less than $2,500.

The report forms were mailed in late December 1974 and early January 1975 to all units on the mailing list. A letter explaining the census and an instruction sheet on how to complete the report form were sent along with each report.

There were four followup mailings after the initial mail-out, at intervals of about 4 weeks. Two of the followups were comprised of letters only and two were comprised of letters and report forms. Additional followup letters were sent to the remaining nonrespondents with size indicators of $40,000 or more. Further followup of the larger nonrespondent units was completed by telephone.

A small stratified sample of the final nonrespondents with size indicators of less than $40,000 sales was selected and a followup survey was completed by mail and telephone to determine the proportion qualifying as census farm operators. The sample estimates were used in a computerized operation to randomly select and assign weights to similar size respondent reports to represent the nonrespondent units. Approximately 12 percent of all census farms and 4 percent of the total value of sales are represented by this procedure.

Processing the Data

All report forms received were clerically reviewed prior to keying the data to magnetic tapes. Reports of large operations or those reports presenting major problems were referred and reviewed in detail by the professional staff. Omissions, inconsistencies, and other problems that could not be resolved by reference to other information on the report were resolved by telephone contact with the respondent.

After keying, the data were subjected to a detailed item-by-item computer edit operation which supplied missing data, corrected data found to be inconsistent or in error, and assigned farm classification codes which were necessary for tabulation of the data.

Entries of large magnitude and significant computer changes of a doubtful nature were manually verified for accuracy. Data correction runs were made to insure the corrections had been properly carried. The data were then tabulated and again reviewed prior to publication.

Survey Design and Methodology

Measuring Coverage

The base or standard used for measuring coverage in the 1974 Census of Agriculture was the area sample of farm operators from the 1974 June Enumerative Survey (JES) conducted by the Statistical Reporting Service (SRS), USDA. The use of the JES data was based upon a cooperative agreement between the SRS and the Bureau of the Census. The type of survey information to be provided and the conditions for use of

the information were specified in the agreement. The agreement illustrates the recent progress being made by government agencies in reducing respondent burden through cooperative data use.

Survey Sample of Farms

The JES was a stratified area sample of farms in the 48 conterminous States. The stratification was geographical, based upon the intensity of agriculture, and included urban as well as rural areas. It used a modified open segment approach in associating farms, land, crops, and livestock with the sample segments. The sample consisted of about 16,200 area segments with about 60,000 segment-associated farm operators. The number of segments in each State ranged from 100 in Nevada to 1,000 in California. The average size of the area segments ranged from about 300 acres in areas where most of the land was under cultivation to about 4,000 acres in the range or grazing areas. The information for the JES was collected in personal interviews by enumerators employed by USDA.

The measurement base used for the 1974 census coverage evaluation did not include the entire JES sample. Only the sample of approximately 22,000 farm operators living inside the segments, for which whole farm data was available, plus the sample of approximately 3,000 nonfarm persons living in the segments was used. The information furnished for the 22,000 resident farm operators included name and address, name of farm or ranch, county, telephone number, acres in place, acres by tenure, and the sales class interval based on total value of farm products sold in 1973. Only the name and address and limited acreage data were obtained for the nonfarm part of the sample. A subsample of the farms with land inside the segment boundaries but with the operator living outside the segment was also used to test an alternative estimation procedure.

In the coverage evaluation processing, smaller operations in the JES were reviewed to determine qualification under the census farm definition. Farms not qualifying were excluded from the measurement base. Although the Census Bureau and USDA use the same general farm definition, some differences occur because of information available and the difference in reporting dates. In addition, JES nonfarm places were reviewed to determine if they qualified as census farms; if they did, they were added to the base. The changes in the farm definition required the application of the previous farm definition as well as the 1974 farm definition. The review of coverage units to determine census farm qualifications included use of the identical criteria as used in processing census data. Places having less than the minimum sales in the census year were counted as farms if they normally could be expected to produce sufficient products to meet farm definition requirements. More detailed information on farm definition criteria is included in volume II, part 1.

The JES provided a source for an evaluation sample which was primarily independent of the census and the sources used to construct the census mailing list. The sample size for 1974 was substantially larger than those used for coverage evaluation prior to 1969 and thus provided geographic detail at the State level and greater reliability than was previously possible.

Processing Procedures

The principal processing operations for the coverage evaluation were:

1. Receipt of selected JES data from the USDA and keying of the data.
2. Stage 1 match of coverage sample units to the entire census name and address file and classification as match, nonmatch, or doubtful match.
3. Mailing of report forms and followup for all nonmatch and doubtful match units.
4. Stage 2 match of nonmatch or doubtful match units to census file using the additional information collected.
5. Technical review for assignment of coverage classification codes based upon a comparison to census report forms.
6. Data keying.
7. Computer consistency edit and edit review.
8. Data tabulation and publication.

The census file was on microfilm and contained about 5.3 million names and addresses. The file consisted of two major parts:

1. Original mail file—Contained about 4.1 million records from the ASCS files and the IRS files 943, 1065, 1120S, 1040F, and 1040C. These are names and addresses to which census reports were mailed in December 1974.
2. ASCS "drop" file—Contained about 1.2 million records consisting of all ASCS only units not selected in the sample.

The stage 1 matching operation involved matching the coverage sample to the entire census file and was accomplished using a computerized name linkage system. The system used the first four alpha characters of the last name and matched within a 5-digit ZIP code area. A review and clerical match was based upon name and address only, since the census data were not available at that time. Specific criteria were established to define match, nonmatch, and doubtful match status and when a match was found no further search was made.

In addition to the primary census file, the coverage sample units were matched to about 1.2 million names on the ASCS list not included in the census mailing list due to sampling.

The stage 1 matching operation was completed in July 1975 and a report form (74-A90, see appendix) was mailed to all nonmatch and doubtful match units in early August 1975. The report form contained basic questions on acres of land, ownership, crops, livestock, value of sales, and operator characteristics. In addition, questions were asked regarding county location, changes in acres operated in 1974, alternate mail addresses, Social Security and employer identification (EI) number, type of business organization, and names and addresses of other persons associated with the operation. Three followup mailings

were performed with telephone followup of the final nonrespondents.

The stage 2 matching operation was a second attempt to locate coverage sample farms. Supplemental information from the 74-A90 report form, such as names of associated persons and alternative addresses, was the primary basis for the additional search. The number of nonmatch and doubtful match units was reduced by about 50 percent in the stage 2 match operation. After the stage 2 matching operation, coverage sample and census materials were assembled and reviewed to determine whether a true match actually existed. They were also reviewed for acreage comparability and classified in relation to the census.

There were 25 coverage classification codes used to identify sample units within the three major groupings: included, overcounted, or missed in the census. Each of the three major classification groups had several subclasses which related to the similarity of acres, the part of the sample or the part of the census involved. A 1 in 10 subsample of coverage units was selected to provide estimates of census coverage of land in farms. Differences in acres for the subsample cases were resolved primarily by telephone followup. If the respondents did not have telephones, necessary information was obtained with assistance from the county ASCS offices. A final review of small operations to determine qualification as a farm under the 1974 definition and an additional search for large farms classified as missed, were also completed during the technical review.

The coverage evaluation data were keyed and a computerized consistency edit was completed. The purpose of the computer edit was to correct keying errors and identify extreme values. Census data records for matched coverage evaluation units were then merged with the coverage data to form a single coverage data file. The tabulation of data was the final processing step.

Estimation Procedure

The coverage evaluation provides estimates of three components in relation to the census:

1. Included.
2. Overcounted.
3. Missed.

The estimates are based upon the JES open segment sample of farms and nonfarm places (farm operator or nonfarm person living inside segment) reclassified on the basis of farm definition. The estimates take the general form,

$Y_t = Y_i - Y_o + Y_m$ where:

Y_t = Estimate of total farms as determined in the coverage check.

Y_i = Estimate of all farms included in the census.

Y_o = Estimate of farms overcounted in the census.

Y_m = Estimate of farms missed in the census.

The estimates of the proportion of farms included in the census are in the form,

$$\text{percent included} = (Y_i / Y_t) \times 100.$$

The estimates of the proportion of net missed farms are in the form,

$$\text{percent net missed} = \frac{(Y_m - Y_o) \times 100}{Y_t}.$$

The estimate for total farms is essentially the original JES direct expansion estimate plus JES nonfarm places reclassified as census farms but excluding places not qualifying as census farms.

The estimates for census farms and acres are based upon data from the final edited census data file used for data tabulation and reflect essentially all processing and computer edit changes. Estimates for farms and value of sales include nonrespondent data represented by census weights. Estimates for acres used a 1 in 10 subsample of segments and excluded nonrespondents and ASCS subsampled units since no census records were available to identify acre differences.

The estimates for value of sales were derived by using sample estimates of sales on included, overcounted, and missed farms in relation to sales on missed farms. The effect of possible over and under reporting of sales is not included.

The JES sample, as discussed earlier, included farms with any land within the segment. However, only the farms with the operators living in the segment are used for the final coverage estimates. In an attempt to provide more accurate estimates of the farm universe and the related census components of coverage, an alternative weighted-segment estimation procedure was tested in several States. This involved selection of a 1 in 3 subsample of area segments and the addition of all farms with land in the subsample segments whose operators lived outside the segment. For each sample farm in the subsample segments, the ratio of acres within the segment to total acres, both within and outside the segment, was computed. The ratio was then applied to the direct expansion weight for each farm to arrive at a weight adjustment as:

adjusted weight =

$$\left(\frac{\text{within segment acres}}{\text{total farm acres}}\right) \times \text{weight} \times 3.$$

In order to determine the feasibility of using the weighted-segment estimation procedure, materials for the additional sample units were prepared and tabulated in five test States. The test States were selected from different sections of the country to represent possible regional differences. After a detailed analysis and review of the tabulated test data it was determined that the estimates of farms produced were generally biased upward. This was caused, mostly, by the tendency for total acres in the farm to be understated for farms with land in the segment but with operators living outside the segment. The total farm acres were used as the numerator in the calculation of the ratio used to adjust the direct expansion weight for each farm. Results from this test were inconclusive and further testing is needed before any decision can be made on the effectiveness of the procedure.

Several estimation problems arose in preparing the coverage evaluation estimates. Two of these problems involved the census nonrespondent population and farms that matched farms not included in the ASCS sample.

In order to represent the census nonrespondent population group, a procedure using predetermined census

weights was used to distribute all such cases over all census classes. This procedure assumes the nonrespondent population is correctly represented by nonresponse adjustment weights.

The second estimation problem involved the JES farms that matched farms not included in the ASCS sample. Since the nonsample places did not receive a census report, no measure of the effect of mailing, processing, or respondent reaction was available. Names and addresses of the JES farms were matched to ASCS nonsample cases and 74-A90's were obtained for all matched cases. However, since the nonsample cases did not reflect effects of census processing, the ASCS sample was represented in the coverage estimation by using the census ASCS sample weights.

For the 1974 census coverage evaluation program, an additional physical search was completed for all missed farms with value of products of $40,000 or more. The purpose of this additional search was to try to locate late additions received subsequent to the initial processing. As a result, some of the missed farms were reclassified to the "included in the census" category.

Coverage Check Results

Estimates of Census Coverage

Estimates of the census coverage for farms are based upon the open segment sample (i.e., farm operators live inside the area segments) from the JES. Estimates for the value of products sold are based upon the sample estimates for the missed farms and sample estimates for the included and overcounted farms. All sample units were reviewed to determine qualification under the 1974 farm definition as well as the 1959 farm definition. Coverage estimates are provided in table 15 under the 1959 definition for comparability purposes.

Estimates of farms and value of products are presented in tables 5, 6, 7, and 8 for the United States and census regions, and specified States in tables 13 and 14. Estimates of land in farms are presented in table 9 by census region and divisions. The sampling error of estimates are presented in tables 16 and 17.

Estimates indicate that about 89 percent of all farms and 97 percent of the value of agriculture products sold are included in the census in the conterminous United States. Census coverage for larger farms (i.e. value of products sold of $2,500 or more) was more complete than for smaller units, since the larger farms are more likely to be included in the census source lists and receive more intensive followup and processing to insure that they are included. Census coverage in the North Central and Western States was somewhat greater than in the Northeastern and Southern States, primarily due to the higher proportions of larger farms in the first two divisions named.

The estimated number of units identified as overcounted in the census was about 41,000 (approximately 2 percent of the estimated total farms). Of these, about 33 percent were duplicated census reports for a single farm. The remaining farms were represented by multiple census nonrespondents or combinations of a census report plus a nonrespondent.

Evaluation estimates for acres reported indicate about a 7-percent net undercount for the United States. This estimate includes acres over and under enumerated on correctly counted farms, acres on overcounted farms, and acres on missed farms. It does not include acres for census nonrespondents of ASCS nonsample units. Components of net error for total land are shown in table 1.

Table 1. **Components of Net Error for Total Land**

(Excludes acres for census nonrespondents and ASCS nonsample units)

	Land in farms (acres)	Percent of estimated total
Reported in census.....	776,043,140	92.6
Plus net difference for correctly counted farms....	+19,631,160	+2.3
Minus acres on overcounted farms.....	-2,773,990	-.3
Plus acres on missed farms..	+45,159,361	+5.4
Estimated total.....	838,059,671	100.0

Characteristics of Missed Farms

Tables 10, 11, and 12 refer only to farms which were not included in the census. Although the missed farms probably represent the larger proportion of the total census error, the data presented do not represent net error. The missed farm data do not represent all the census error because the reporting error for items other than acres on included and overcounted farms was not measured.

The estimated total farms identified as missed in the census was approximately 266,000. These farms are primarily smaller operations with less than $2,500 value of products sold. About 60 percent of the missed farms are in this group. The total missed farm group had an estimated 3.0 percent of the total value of all agricultural products sold, which further indicates their relatively small size.

The farm operations not included in the census are classified into two groups:

1. Coverage sample farms not located on the census mailing list.
2. Coverage sample farms on the census mailing list which were classified as nonfarm (out of scope) due to incorrect reporting, incomplete reporting, or processing error.

The coverage estimates indicate about 59 percent of the total missed farms were not on the mailing lists and 41 percent were on the mailing lists but were incorrectly classified based on the information reported. For missed farms with $2,500 or more value of products sold, about 56 percent were not on the mailing lists and 44 percent were on the mailing lists but misclassified based on information reported. Further analysis was completed to determine the reasons for the incorrect classification. The reasons for misclassification were extracted from census questionnaires, correspondence with respondents, and records rejected by the computer because they failed to meet minimum farm criteria. The major reason that the census respondent was classed as out of scope was because of an incorrect or incomplete response to the screening questions on the questionnaire, presumably caused by a misunderstanding or misinterpretation of the questions (section 2 of form 74-A1). The screening question response problem accounted for about 53 percent of the

total misclassified units. The reasons for misclassification are shown in table 2.

Other Results

One of the objectives of the 1974 coverage check was to evaluate the quality and characteristics of sources for the census mailing list. Table 3 shows some estimates for the United States by mailing list source or source combination and by number of matched records. The coverage units matched to the census is slightly higher than farms included in census due to inclusion of those units matched to the census mail file but not qualifying as farms.

The table gives the mailing list sources and source combinations for coverage units matched to the census. It is apparent that no one source was adequate for determining the mailing list. The largest contributor of names and addresses was the combination of IRS sources. These accounted for about 70 percent of the total matched records. However, some of the sources providing relatively small numbers of matched records account for a disproportionally high share of the total value of products.

Since several sources were used in compiling the mailing list and some respondents used alternate addresses not identified as representing the same operation, more than one report form was inadvertently mailed to some respondents. Table 3 also gives estimates by mailing list source of the number of times a census farm appeared on the mailing list after unduplication. Instructions were given to each respondent to complete only one of the forms and return the others blank. In most cases this instruction was followed; however, to the small extent that farm operators submitted more than one completed report without the duplication being discovered during processing, duplication exists in the data file.

The master mailing list for the 1974 Census of Agriculture contained the names and addresses of persons and organizations known to be associated with agriculture operations. To facilitate processing and nonresponse followup, each name on the master list was assigned a size code (usually from the administrative record source) indicating an estimate of value of sales. Subsequent to the census, these size codes were compared with the actual value of sales reported by the respondent. Results of this comparison indicated about 40 percent of total farms were erroneously classified, i.e., did not fall within the size class predicted by value of sales. For specific value groups, the highest misclassification (56 percent) were those with sales of

Table 2. **Farms Misclassified as Nonfarms During Census Processing**

	Missed farms	Percent
Total	108,560	100.0
Entries to screening questions	57,832	53.3
No longer farming	9,583	8.8
Did not meet farm criteria, computer rejected	3,977	3.7
Returned, because of insufficient address	3,535	3.3
Reported as landlord only	2,983	2.7
Retired from farming	1,776	1.6
Correspondence information only, no census questionnaire	1,400	1.3
Deceased	1,332	1.2
Respondent claims filed, unable to find questionnaire	782	.7
Other reasons	25,360	23.4

Table 3. **Coverage Units Matched to the Census by Source**

	Total coverage units matched in census		Matched to 1 census record		Matched to 2 census records		Matched to 3 or more census records	
	Number	Percent of all farms	Number	Percent of all farms	Number	Percent of all farms	Number	Percent of all farms
All coverage units	2,594,641	100.0	2,195,984	100.0	287,036	100.0	111,621	100.0
1040 only	317,979	12.3	313,801	14.3	3,836	1.3	342	.3
1040 and ASCS	1,210,491	46.7	1,109,644	50.6	100,664	35.1	183	.2
1040 and 943	26,898	1.0	22,008	1.0	4,890	1.7	-	-
1040, ASCS, and 943	223,156	8.6	178,677	8.1	43,990	15.3	489	.4
ASCS only	467,815	18.0	448,155	20.4	17,632	6.1	2,028	1.8
ASCS and 943	44,563	1.7	18,131	.8	24,368	8.5	2,064	1.8
943 only	21,819	.8	19,863	.9	1,782	.6	174	.2
Special list only	9,161	.4	8,462	.4	144	.1	555	.5
1065 only	6,306	.2	6,158	.3	148	.1	-	-
Other	266,453	10.3	71,085	3.2	89,582	31.2	105,786	94.8

Section 2 > FARMING, RANCHING, OR OTHER AGRICULTURAL ACTIVITIES IN 1974

1. At any time in 1974 did you raise, produce, or sell ANY amount of any of the items listed below? YES 1 ☐ NO 2 ☐

- Crops
- Hay, pasture, sod
- Vegetables, melons, mushrooms
- Fruits, nuts, berries, and citrus
- Cattle (including feedlots)
- Hogs, sheep, goats, horses
- Poultry, eggs
- Dairy products
- Forest products on farms
- Greenhouse and nursery products
- Fish in captivity
- Fur-bearing animals in captivity
- Other animal specialties

2. Did you at any time in 1974 raise or produce any agricultural products for contractors such as feed companies, processors, or packers? YES 1 ☐ NO 2 ☐

3. Did you raise or produce any agricultural products for others or with others under a partnership, share arrangement, or other rental agreement in 1974? YES 1 ☐ NO 2 ☐

4. Did you own any land that was used by someone else for agricultural purposes in 1974? YES 1 ☐ NO 2 ☐

5. Did you own any livestock or poultry that was cared for by someone else under a share agreement or custom arrangement in 1974? YES 1 ☐ NO 2 ☐

▶ ***If you answered YES to ANY of these questions, go to Section 3.***

▶ ***If you answered NO to ALL five of these questions, tear off this front cover and mail it back to us in the envelope provided.***

$100,000 or more and the lowest misclassification were those with sales of $5,000 to $39,999. Table 4 shows a distribution of mail size codes by value of sales. The misclassification is largely due to the difference in reporting unit and reference dates between the source records and the census.

Table 4. **Percent Distribution of Mail Size Codes by Value of Sales**

	Value of sales reported				
	$100,000 and over	$40,000 to $99,999	$5,000 to $39,999	$2,000 to $4,999	Under $2,000
Predicted value of sales	100.0	100.0	100.0	100.0	100.0
$100,000 and over	[1]43.7	6.9	1.4	0.5	0.4
$40,000 to $99,999	34.4	[1]48.3	7.1	1.0	.7
$5,000 to $39,999	14.2	37.6	[1]67.9	29.5	11.0
$2,000 to $4,999	4.4	3.9	14.1	[1]38.7	22.2
Under $2,000	3.3	3.3	9.5	30.3	[1]65.7

[1]Proportion within the predicted size class.

Accuracy of the Estimates

Estimates of sampling variability expressed as standard errors are presented in tables 16 and 17. The chances are about two out of three that the difference between an estimate based on the coverage check sample and the result that would have been obtained by applying the coverage check procedures to all farms would be less than the sampling error shown. The chances are about 95 out of 100 that this difference would be less than 2 times the sampling error.

The standard error for the coverage check estimates of total farms expressed as percent of estimated total, was 1.2 percent at the United States level; ranges from 2.1 to 7.1 percent at the census division level; and 2.8 to 10.7 percent at the State level. Sampling errors were computed directly for the total, included, and missed components. The estimates of sampling error for the overcounted farms are based on a very small number of observations and are not considered reliable, therefore, they are not published. In addition, coverage estimates are presented only for census divisions or State groups where individual State estimates are not considered reliable and thus are not published separately. Estimates of sampling error for acres were not computed, but are considerably higher than for farms since the acre estimates are based upon a 1 in 10 subsample of segments.

There are several aspects of the coverage check procedures which make it probable that the estimates of net error are somewhat larger than the actual undercount. First, the difficulty of carrying out searching and matching procedures was great, and some of the farms corresponding to coverage check farms may not have been located. An intensive study completed in the 1969 census evaluation program indicated about 5 percent of the farms classified as missing were actually included in the census.

Second, once a census farm corresponding to a coverage check farm was located, there was no systematic attempt to search the census files further for duplicate report forms, so that some cases of duplication in the census may have been overlooked. Duplicate cases which were found were normally adjacent in the file and in the same ZIP code area. To make a thorough search would have been costly in both time and money, as it would have been necessary in all matched cases, to make additional checks in adjacent and other ZIP code areas and counties.

The estimates of total farms from the coverage check sample are low in relation to data from other sources. For example, using the previous census farm definition, the coverage check estimate of 2.3 million total farms compares to the USDA estimate of 2.8 million farms. In addition, using the 1974 census farm definition the coverage estimate of 1.9 million farms included in the census compares with 2.4 million farms counted in the 1974 Census of Agriculture. The primary reasons for these lower coverage check estimates appear to be related to the sample design of the JES and the difference between enumeration dates for the census and the JES. The measurement base used for the coverage check was the JES area sample of farm operators living inside the segment boundaries. Although the JES contains some urban segments, there are indications that the part of the sample used for the coverage check may underrepresent farms operated by persons not living on their farms.

A special tabulation of farms in the coverage sample by residence was made for all States and compared with census counts. The census data indicated about 20 percent of the farm operators did not live on their farms. Census data for JES farm operators who were classified as included in the census in the coverage sample, indicated about 11 percent did not live on their farms. The proportion of coverage check nonresident operators missed in the census was about the same as for those included; therefore, this possible bias may not have a large effect upon the coverage proportions.

The enumeration for the JES took place in the latter part of May 1974, while most census data were collected during the first few months in 1975. The difference in reporting dates caused some matching difficulties when farms were sold, operators moved to different farms, or operators died. In general, farms dropped from the base sample as a result of these situations and there was no practical method available to add new farms into the base sample. The number of farms affected by the difference in dates has not been determined from the coverage sample; however, a previous study made in connection with the 1965 sample survey of agriculture indicated about 5 percent of the farms had changes of ownership or operators during a 1-year period.

An additional factor contributing to the low level estimates is the possible deficiency in the coverage estimates resulting from the fact that a little more than 4 percent of the cases were unclassified. Unclassified cases are those which were matched to the census mail list but the census report forms could not be located and also those not matched to

the mail list for which 74-A90 report forms could not be obtained. If the correct classification could have been determined, the unclassified group most likely would have been spread throughout all coverage components. However, it is likely that the unclassified group would be concentrated more heavily in the missed farms component since the majority of these cases were not matched to the mail list.

The assumption that all nonrespondent farms are correctly represented in the census as a result of the nonrespondent adjustment procedure may produce some bias in the coverage estimates. The nonresponse adjustment represented about 12 percent of the farms and about 4 percent of the value of products sold in the 1974 census. The coverage sample had an 11.8 percent imputation rate compared with 12.3 percent imputation rate in the census indicating a high level of correlation. Considerable variability, however, occurs at the division and State levels.