

TECHNICAL MONOGRAPH

UNITED STATES
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CO-OPERATIVE STUDY



ANALYSIS OF SPECIFIED FARM CHARACTERISTICS
FOR FARMS CLASSIFIED BY TOTAL
VALUE OF PRODUCTS

United States
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Washington: 1943

This technical monograph is based upon a 2-percent sample from the 1940 Census of Agriculture. The figures are, therefore, subject to sampling errors. The Bureau of Agricultural Economics assumes responsibility for the procedures followed, and for the analysis of the data. The Bureau of the Census is responsible for drawing the sample, for the computations involved in tabulating and expanding the sample data, and for the preparation of the tables. For additional definitions and explanations of the items covered in this report see the 1940 Agriculture Census Reports, particularly volume III.

SIXTEENTH CENSUS OF THE UNITED STATES: 1940

REPORTS ON AGRICULTURE, IRRIGATION, AND DRAINAGE¹

VOLUME I.—STATISTICS BY COUNTIES FOR FARMS AND FARM PROPERTY, WITH RELATED INFORMATION FOR FARMS AND FARM OPERATORS; LIVESTOCK AND LIVESTOCK PRODUCTS; AND CROPS (six parts):

PART 1.—NEW ENGLAND, MIDDLE ATLANTIC, AND EAST NORTH CENTRAL STATES	PART 4.—EAST SOUTH CENTRAL STATES
PART 2.—WEST NORTH CENTRAL STATES	PART 5.—WEST SOUTH CENTRAL STATES
PART 3.—SOUTH ATLANTIC STATES	PART 6.—MOUNTAIN AND PACIFIC STATES

VOLUME II.—STATISTICS BY COUNTIES FOR VALUE OF FARM PRODUCTS, FARMS CLASSIFIED BY MAJOR SOURCE OF INCOME, AND FARMS CLASSIFIED BY TOTAL VALUE OF PRODUCTS (three parts):

PART 1.—NORTHERN STATES	PART 2.—SOUTHERN STATES	PART 3.—WESTERN STATES
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VOLUME III.—GENERAL REPORT—STATISTICS BY SUBJECTS FOR THE UNITED STATES, GEOGRAPHIC DIVISIONS, AND STATES (one volume):

CHAPTER I.—FARMS AND FARM PROPERTY	CHAPTER VI.—COOPERATION, LABOR, EXPENDITURES, MACHINERY, FACILITIES, AND RESIDENCE
CHAPTER II.—SIZE OF FARMS	CHAPTER VII.—LIVESTOCK AND LIVESTOCK PRODUCTS
CHAPTER III.—COLOR, TENURE, AND RACE OF FARM OPERATOR	CHAPTER VIII.—FIELD CROPS AND VEGETABLES
CHAPTER IV.—FARM MORTGAGES AND FARM TAXES	CHAPTER IX.—FRUITS AND NUTS, AND HORTICULTURAL SPECIALTIES
CHAPTER V.—WORK OFF FARM, AGE, AND YEARS ON FARM	CHAPTER X.—VALUE OF FARM PRODUCTS

United States Summary Bulletins.—Statistics for the United States, Geographic Divisions, and States in condensed form as follows:

First Series Summary—Number of Farms, Uses of Land, Values, Principal Classes of Livestock and Livestock Products; and Specified Crops Harvested.

Second Series Summary—Farm Mortgages, Taxes, Labor, Expenditures, and Miscellaneous Farm Informatics; Goats and Mohair; and Fruits, Vegetables, and Minor Crops.

Third Series Summary—Value of Farm Products, Farms Classified by Major Source of Income, and Farms Classified by Total Value of Products.

Territories and Possessions.—Farms and Farm Property, Livestock and Livestock Products, and Crops (one volume).

(Separate agricultural bulletins are available for Hawaii and Puerto Rico)

Territories—Alaska and Hawaii.

Possessions—American Samoa, Guam, Puerto Rico, and Virgin Islands of the United States.

Irrigation of Agricultural Lands.—Statistics by Drainage Basins and by Counties for 20 Irrigation States and a Summary for the United States (one volume).

Twenty Separate State Maps Showing Irrigation by Drainage Basins.
A Separate Composite Map Showing Irrigation by Drainage Basins.

Drainage of Agricultural Lands.—Statistics for 38 Drainage States with County Data for 36 States and a Summary for the United States (one volume).

A Separate Map of the United States Showing Location of Land in Drainage Enterprises for 38 States.

SPECIAL STUDIES AND MONOGRAPHS

Special Poultry Report.—Statistics by Geographic Divisions and States for Poultry of All Kinds on Hand and Raised; by Counties for Chickens and Chicken Egg Production by Number of Chickens on Hand; and by Counties for Farms Reporting Chickens and Turkeys Raised by Numbers Raised (one volume).

Cows Milked and Dairy Products.—Number of Cows Milked, Milk Produced, Disposition of Dairy Products, and Number of Cows Kept Mainly for Milk Production, Classified by Number of Cows Milked, by Counties; With Related Data for Other Classes of Livestock and Livestock Products for the States and also for the United States (one volume).

Special Cotton Report.—Cotton Harvested by Number of Bales Harvested, and by Counties, With Acreage and Production of Cotton, and Value of Farm Products (one volume).

Special Cross-line Acreage Report.—Farms Reporting and Acreage by Place of Enumeration and by Location of Acreage, With Relationship to All Farms, by Counties: 1940 and 1935 (one volume).

Abandoned or Idle Farms.—Number and Acreage, With Classification or those Reporting Acreage by Cause of Nonoperation and by Year of Abandonment, by States and by Counties, with a Summary for the United States.

Drainage Monograph.—A Comparison of Agriculture Within and Outside of Drainage Enterprises in the Alluvial Lands of the Lower Mississippi Valley (paper bound).

Irrigation Monograph.—A Tabular and Graphic Presentation of Specified Irrigation Census Statistics (paper bound).

¹Agriculture volumes I and II and the volumes "Irrigation of Agricultural Lands" and "Drainage of Agricultural Lands" are comprised of State bulletins. Separate bulletins for each State are available. Separate chapters of Agriculture volume III are also available.

Letter of Transmittal

DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
Washington, D. C., June 30, 1943.

SIR:

I transmit herewith for publication a technical monograph based on the Census of Agriculture Returns of the Sixteenth Decennial Census entitled "Analysis of Specified Farm Characteristics for Farms Classified by Total Value of Products." This monograph shows the relationship between the value of farm products sold, traded, or used by farm households in 1939 and the characteristics and resources of the farm, the characteristics of the farm operator, and farm labor and farm expenditures.

Provision for the Sixteenth Decennial Census was made in the Act providing for the Fifteenth and subsequent Decennial Censuses which was approved June 18, 1929. The information contained in this monograph is based, in large part, upon a 2-percent sample of the reports which were secured from farm operators by census enumerators in a personal canvass of the individual farms.

This monograph is the result of the cooperative study authorized in the memorandum of understanding, dated July 30, 1942, between the Bureau of the Census and the Bureau of Agricultural Economics and the Farm Security Administration of the United States Department of Agriculture.

The Bureau of the Census was responsible for drawing the sample, for the computations involved in tabulating and expanding the sample data, and for the preparation of the tables. The Bureau of Agricultural Economics assumed responsibility for the procedures followed and for the analysis of the data.

This study was made, principally, by Roy L. Roberts, Social Scientist, Bureau of Agricultural Economics, United States Department of Agriculture, and Irvin Holmes, Principal Agricultural Statistician, Prices and Values, Division of Agriculture, Bureau of the Census, with the valued cooperation of numerous staff members of both agencies and bureaus.

Respectfully,

J. C. CAPT,
Director of the Census.

HON. JESSE H. JONES,
Secretary of Commerce

(III)

Preface

Wartime planning for agriculture calls for a large volume of basic information about the organization of American agriculture. One of the first questions raised by the demand for increased production was, "Which groups of farms and farmers could contribute most to increased food production?". It was known that the most productive third of our farms contributed 84 percent of the marketed agricultural products and that the least productive third contributed only 3 percent. The middle third, contributing 13 percent of the marketed crops, appeared to many to offer particularly good possibilities for increased food production. But the available data provided little information on the characteristics of the farms or of the farmers in each of these groups.

The availability of recent data from the Census of Agriculture suggested the possibility of securing much needed information from that source. Limitations of costs and time made it impossible to include in the regular Census summaries much of the material which is desired for investigation of special problems. It was known, however, that the farm and ranch schedules of the 1940 Census of Agriculture contained many data that would be useful, if special tabulations and analyses could be made. The possibility of making these tabulations on a sample basis offered many advantages and a considerable saving in cost. Accordingly the Bureau of Agricultural Economics was glad to join with the Farm Security

Administration and the Bureau of the Census to make such tabulations possible.

For this purpose the gross value of products seemed a desirable measure of the size of farm operations, and cross tabulations on that basis were agreed upon. It was desired to distinguish characteristics and resources of those farms which provided the operator with all of his income from those of farms of part-time farmers or rural residents. Closely associated with this problem was the one relating to "commercial" and "non-commercial" farms. Agricultural planning must consider all farms, but experience with agricultural programs has made it increasingly clear that programs designed for one group of farms might not be adapted to another group. For some purposes the relatively small and unproductive farms should be considered separately but until detailed information about their characteristics and the characteristics of their operators was available, this could not be done.

In addition to providing data which were badly needed for agricultural program planning, this project has also pointed one way to a more complete utilization of the large amount of data ordinarily collected as part of a census. By applying the principles of sampling from a universe of known characteristics it was possible at relatively small expense to utilize more fully information already available and to reduce the necessity for field investigations to secure certain types of information.



Chief, Bureau of Agricultural Economics.

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The Sample

SOURCES OF DATA

In the tables presenting statistics based on sample data the marginal totals and the figures for farms with "\$10,000 and over" total value of farm products, when printed in bold face type, are recorded Census totals. Figures not in bold face type, showing the breakdown by value groups of the totals for each item and for cross classifications the breakdowns by items of the totals for each value group, are based upon a sample of 2 percent of the 1940 census reports for individual farms, expanded and adjusted to agree with the recorded marginal totals.

SAMPLE DESIGN

The 2-percent sample of individual farms was selected by machine by sorting out all punch cards with serial numbers ending in 15 and 65. These serial numbers had been placed on the individual farm schedules before the data were transferred from the schedules to the punch cards. The selection of the sample farms was on a county basis; that is, the 2-percent sample was stratified geographically by counties. There were only 22 counties, chiefly independent cities in Virginia, in the United States which had less than 15 farms at the time of the 1940 census, and which were, therefore, excluded from this 2-percent sample.

Although the machine selection of the sample farms was done by counties, the individual farm schedules were arranged by minor civil divisions within each county before numbering. Consequently, the geographic distribution of the sample farms approaches a stratification by minor civil divisions within each county. To a considerable extent, the original order of enumeration was preserved in numbering the schedules. Accordingly, the 2-percent sample also approximates a selection of every 50th farm along the enumerator's route.

METHOD OF EXPANDING THE SAMPLE

The sample figures for all items in this report were expanded by value groups in proportion to the number of farms represented by the sample for each value group. For items for which recorded totals for all value groups were available, these expanded figures by value groups were then scaled to the recorded total by a proportionate adjustment. For a very few items, for which recorded totals were not available, the expanded sample figures were used without adjustment. For cross classifications,

involving two sets of recorded marginal totals, a succession of horizontal and vertical proportionate adjustments were made, this procedure being continued until all figures in the cells of the table harmonized with the two sets of recorded marginal totals.

STATE AND COUNTY FIGURES BASED ON SAMPLE DATA NOT AVAILABLE

The tables presenting figures based on sample data show only the totals for geographic divisions, for the Appalachian Region, and for the United States. *Figures for States and smaller geographic areas, based on sample data, will not be available, since, for most States, such figures would not possess the requisite statistical precision.*

PRECISION OF DATA

Because of cost considerations, it was considered impractical to vary the size of sample by value groups or by geographic areas. For this reason, it is to be expected that the relative sampling errors will be considerably smaller for the central value groups, for which the number of farms is generally large, than for terminal value groups which have few farms. A similar difference in relative sampling errors is to be expected as between geographic divisions with large numbers of farms and geographic divisions with fewer farms. Likewise, the relative sampling errors differ as between items, depending, in the case of the farm counts, upon differences in the proportion of farms reporting specified characteristics, and for quantitative items, upon differences in the variability of the items.

For these reasons, in the tables accompanying this report, figures are marked with asterisks when the coefficient of variation, as indicated by sample data, was approximately 10 percent or more. In using these figures marked with asterisks, it should be kept in mind that the sampling error for any such individual figure may be greatly in excess of 10 percent (either way). For the figures not marked with asterisks, it is unlikely that the values shown are in error by more than about 10 percent, and very unlikely that they are in error by more than approximately 20 percent. In evaluating the reliability of the figures, the consistency in the pattern of relationships should be taken into account as well as the indicated precision for individual cells.

A more detailed discussion of the sample is presented in the Appendix.