Farm Computer Usage and Ownership Methodology and Quality Measures

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June Area Survey Methodology for Farm Computer Usage and Ownership

Scope and Purpose: Farm computer usage and ownership are estimated biennially in August. Estimates made for this program include percent of farms with access to a computer, percent of farms that own or lease a computer, percent of farms using the computer for farm business purposes, and percent of farms with access to the Internet. For operators with access to the Internet, data are collected for the operator's primary method of access and ways in which the operator uses the Internet for farm business and personal use. The percent of farms using dialup, DSL, cable, fiber optic, mobile, satellite, or other means of accessing the Internet are also estimated. Estimates are published for the United States and by State.

The computer use data are collected as part of the June Area Survey, a multipurpose survey used to estimate crop acreages and measure incompleteness of the NASS list frame for numerous other surveys. The June Area Survey is conducted every year in all states except Alaska and Hawaii with computer use questions added in odd-numbered years.

Survey Timeline: Some pre-survey screening is done in May to identify farm operators to be interviewed. Data collection is conducted by personal interview from the end of May through mid-June. The reference date for the June Area Survey is June 1. Regional Field Offices conduct editing and analysis over a three-week period, ending in late June. Once editing is complete, the data are summarized. Survey results are reviewed and State and National estimates are established. The Farm Computer Usage and Ownership estimates are published in August in odd numbered years.

Sampling: The target population for the farms and land in farms estimates is all farms and ranches with $1,000 or more in agricultural sales (or potential sales). The June Area Survey utilizes an area sampling frame. The area frame consists of all land in all states, except Alaska, and thus represents all farms and ranches. Although Hawaii has an area frame, NASS does not conduct the June Area Survey in Hawaii. The frame in each state is divided into segments of land. For more intense agricultural regions, segments are about one square mile in size. An optimal sample is selected in each state with a national sample size of approximately 31,000. The cost of building the frame and preparing materials for enumeration is significant, so sampled segments are in the survey for five to six consecutive years.

Through personal interviews, field enumerators divide the segments into tracts, each tract representing a unique operating arrangement. Some of the tracts do not qualify under the farm definition and screen out; the remaining agricultural tracts become the sample for computer use.

Data Collection: Each enumerator is responsible for several segments of land. Enumerators must account for all operations and land contained in their assigned segments. All respondents are contacted in person by an enumerator, and a personal interview is conducted. Survey questionnaires are returned to the Regional Field Offices where they are visually reviewed and key entered.

Questionnaire content and format are evaluated annually through a specifications process where requests for changes are evaluated and approved or disapproved. Input may vary from question wording or formatting to a program change involving the deletion or modification of current questions or addition of new ones.

All Federal data collections require approval by the Office of Management and Budget (OMB). NASS must document the public need for the data, show the design applies sound statistical practice, ensure the data do not already exist elsewhere, and that the public is not excessively burdened. The June Area questionnaire must display an active OMB number that

gives NASS the authority to conduct the survey, a statement of the purpose of the survey and the use of the data being collected, a response burden statement that gives an estimate of the time required to complete the form, a confidentiality statement that the respondent's information will only be used for statistical purposes in combination with other producers, and a statement saying that response to the survey is voluntary and not required by law.

Survey Edit and Imputation: As survey data are collected and captured, data are edited for consistency and reasonableness using automated systems. Reported data are edited as a batch of data when first captured. The edit logic ensures the coding of administrative data follows the methodological rules associated with the survey design. Relationships between data items (i.e. responses to individual questions) on the current survey are verified. Some data items in the current survey are compared to data items from earlier surveys to ensure certain relationships are logical. The edit will determine the status of each record to be either "dirty" or "clean" (i.e. failing or passing the edit requirements for consistency and reasonableness). Records that fail edit requirements must be updated or must be certified by an analyst to be exempt from the failed edit requirement.

After the edit, missing data due to item-nonresponse or respondents not knowing the answer to the question, are run through model-based imputation methods. The model uses a bootstrap forest procedure (nonparametric) using Census of Agriculture data and past June Area data as cross validation to estimate the likelihood of response, which was then used to draw imputations for the internet access item. The remaining items were imputed by forming similar groups based on geography, type of farm, and size of farm and using a hot deck procedure to draw imputed values from responding records within each group. Only records that pass edit requirements (whether model-based imputation was used or not) are eligible for final summary.

Nonsampling Errors: Nonsampling errors are present in any survey process. These errors include reporting, recording, and editing errors. Steps are taken to minimize these errors, such as comprehensive interviewer training, validation, and verification of processing systems, application of detailed computer edits, and evaluation of the data via the analysis tools.

Estimators: The June Area computer use estimates utilize a weighted segment estimator. Response to the June Area Survey is voluntary. Some producers refuse to participate in the survey, others cannot be located during the data collection period, and some submit incomplete reports. These nonrespondents must be accounted for if accurate estimates of computer usage are to be made. For the computer use data, nonresponse is accounted for by adjusting the sampling weights of good respondents to account for the nonrespondents. Adjustments are made within stratum by state which compensates for non-uniform response across strata.

Estimation: The computer use data are separated from the June Area dataset and summarized. Since all States conduct identical surveys, the State data can be pooled and national survey results computed. The summary results provide point estimates and their standard errors for each data series being estimated. It also provides information used to assess the performance of the current survey and evaluate the consistency of the survey estimates.

Survey results are delivered to a subject matter specialist for review and acceptance. All review is performed in NASS's Washington, D.C. Headquarters. Current results are reviewed, in tabular form, against the historical data series for consistency and reasonableness. State results are examined by region for geographic consistency. Any irregularities revealed in the analysis are investigated and, when necessary, resolved. Survey results are adopted as the official estimate except in a few instances where strong justification supports a deviation from the summarized data. In these instances, the estimates are evaluated and adjusted based on data relationships in the other States within the same region. All estimates are subject to supervisory approval before being released by the Agricultural Statistics Board.

Revision Policy: For non-census years, computer use values are subject to a biennial revision. After the 5-year Census of Agriculture is completed, computer use estimates are subject to revisions.

Quality Metrics for Farm Computer Usage and Ownership

Purpose and Definitions: Under the guidance of the Statistical Policy Office of the Office of Management and Budget (OMB), the United States Department of Agriculture's National Agricultural Statistics Service (NASS) provides data users with quality metrics for its published data series. The metrics tables below describe the performance data for the survey contributing to the publication. The accuracy of data products may be evaluated through sampling and nonsampling error. The measurement of error due to sampling in the current period is evaluated by the coefficient of variation for each estimated item. Nonsampling error is evaluated by response rates.

Farm Tract is a portion of a sampled segment that represents a unique operating arrangement that meets the definition of a farm.
Sample Size is the total number of farm tracts found in the sampled segments in the June Area Survey.
Response rates measure the proportion of total farm tracts responding to the June Area Survey.
Coefficient of Variation provides a measure of the size for the standard error relative to the point estimate and is used to measure the relative precision of the results of a survey estimator.

June Area Survey Sample Size and Response Rates: To assist in evaluating the performance of the estimates in the *Farm Computer Usage and Ownership* report, the sample size and response rates are displayed. The sample size changes from year to year as the number of farm tracts identified within the sampled segments varies.

June Area Survey Sample Size and Response Rates – United States: 2017 and 2019

	2017	2017	2019	2019
	Sample size	Response rate	Sample size	Response rate
	(number)	(percent)	(number)	(percent)
United States	37,831	68.1	31,005	67.8

Quality Metrics for Farm Computer Usage – States and United States: 2017 and 2019

State	Coefficient of variation			
	Farms with desktop or laptop computer access		Farms that own or lease desktop or laptop computers	
	2017	2019	2017	2019
	(percent)	(percent)	(percent)	(percent)
Alabama	5.7	8.8	6.1	8.9
Arizona [1]	8.0	13.3	8.5	14.1
Arkansas	5.7	6.2	6.1	6.9
California	7.7	3.1	9.0	3.5
Colorado	3.4	4.6	4.5	5.2
Florida	9.6	6.4	10.8	10.4
Georgia	8.6	4.0	9.1	4.3
Idaho	3.0	4.3	4.3	4.5
Illinois	2.5	4.0	2.7	4.1
Indiana	3.3	6.1	3.6	6.6
Iowa	2.9	2.8	3.0	3.0
Kansas	4.1	4.0	4.4	4.6
Kentucky	4.8	4.5	5.1	4.9
Louisiana	7.2	10.1	8.0	11.5
Maryland [2]	6.4	7.5	8.3	9.2
Michigan	4.8	6.9	5.7	7.1
Minnesota	2.6	2.5	2.8	2.7
Mississippi	5.4	9.0	6.0	9.5
Missouri	4.3	4.7	4.5	4.8
Montana	3.3	4.6	3.8	4.8
Nebraska	3.6	4.4	3.7	4.5
New Hampshire [3]	4.8	4.4	5.5	5.6
New Jersey	3.6	15.6	5.0	17.1
New Mexico	11.9	15.0	14.8	15.1
New York	4.2	7.2	4.6	8.7
North Carolina	7.4	7.1	8.3	9.1
North Dakota	3.5	3.4	3.8	3.8
Ohio	4.9	5.5	5.2	5.8
Oklahoma	5.5	6.1	6.6	6.9
Oregon	4.6	2.9	5.3	6.3
Pennsylvania	5.4	7.0	5.7	7.6
South Carolina	13.1	24.8	14.3	26.3
South Dakota	4.1	3.8	4.3	4.0
Tennessee	3.7	4.5	3.8	4.9
Texas	2.0	2.9	2.2	3.1
Utah	5.2	3.5	6.3	4.6
Virginia	6.4	9.5	7.2	10.3
Washington	4.9	7.1	5.8	7.5
West Virginia	10.2	10.0	10.9	11.5
Wisconsin	3.6	4.0	3.9	4.5
Wyoming	4.6	3.0	7.1	3.0
United States [4]	0.8	0.9	0.9	1.0

[1] Includes Arizona and Nevada.
[2] Includes Delaware and Maryland.
[3] Includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
[4] Excludes Alaska and Hawaii.

Quality Metrics for Farm Computer Usage – States and United States: 2017 and 2019

State	Coefficient of variation			
	Farms using desktop or laptop computers for farm business		Farms with Internet access	
	2017	2019	2017	2019
	(percent)	(percent)	(percent)	(percent)
Alabama	9.5	12.0	5.6	8.5
Arizona [1]	23.9	25.3	8.4	12.9
Arkansas	9.1	10.0	5.8	5.2
California	10.6	7.8	8.7	3.8
Colorado	6.3	10.3	3.2	4.5
Florida	14.2	14.4	8.5	6.1
Georgia	12.7	7.5	8.7	4.3
Idaho	10.7	10.6	3.1	2.3
Illinois	4.0	5.3	2.4	4.0
Indiana	6.4	8.2	3.5	6.0
Iowa	3.9	3.9	2.9	2.9
Kansas	6.3	5.9	3.8	3.5
Kentucky	8.1	8.4	4.6	3.8
Louisiana	12.5	17.8	6.5	8.8
Maryland [2]	11.0	15.6	7.3	7.9
Michigan	8.7	9.4	3.3	6.7
Minnesota	4.5	4.0	2.9	2.3
Mississippi	8.2	13.1	4.9	8.0
Missouri	6.7	6.8	4.2	4.2
Montana	5.5	6.9	2.9	4.3
Nebraska	5.2	5.5	3.0	4.4
New Hampshire [3]	10.1	9.3	5.3	3.3
New Jersey	8.5	24.7	2.8	13.0
New Mexico	18.7	20.1	11.2	14.5
New York	7.5	11.3	4.1	7.3
North Carolina	12.3	15.2	7.5	7.1
North Dakota	5.7	5.0	3.2	3.2
Ohio	6.6	7.8	4.9	5.3
Oklahoma	8.7	10.9	4.4	5.0
Oregon	8.4	12.0	4.6	4.9
Pennsylvania	7.9	12.4	5.3	7.4
South Carolina	17.9	40.4	12.0	22.9
South Dakota	5.6	5.8	3.7	3.7
Tennessee	6.1	7.2	3.9	4.5
Texas	4.2	5.1	2.0	2.9
Utah	9.3	6.0	4.6	3.2
Virginia	9.0	13.4	6.9	8.1
Washington	10.7	11.3	6.9	6.5
West Virginia	14.8	15.0	9.7	10.6
Wisconsin	6.0	7.8	3.3	3.3
Wyoming	12.1	15.7	5.1	4.7
United States [4]	1.4	1.5	0.8	0.9

[1] Includes Arizona and Nevada.
[2] Includes Delaware and Maryland.
[3] Includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.
[4] Excludes Alaska and Hawaii.