ISSN: 2167-1311

Technology Use (Farm Computer Usage and Ownership) Methodology and Quality Measures

Released August 30, 2023, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA).

June Area Survey Methodology for Technology Use (Farm Computer Usage)

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

The farm technology 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 technology 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 phone 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 Technology Use 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 phone 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 technology 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 by phone by an enumerator, and a phone 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 imputation 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 are eligible for final summary.

Non-sampling Errors: Non-sampling 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 farm technology 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 non-respondents must be accounted for if accurate estimates of farm technology use are to be made. For the farm technology use data, nonresponse is accounted for by adjusting the sampling weights of good respondents to account for the non-respondents. Adjustments are made within stratum by state which compensates for non-uniform response across strata.

Estimation: The farm technology 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, farm technology use values are subject to a biennial revision. After the 5-year Census of Agriculture is completed, farm technology use estimates are subject to revisions.

Quality Metrics for Technology Use (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 *Technology Use (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: 2021 and 2023

	2021	2021	2023	2023
	Sample size	Response rate	Sample size	Response rate
	(number)	(percent)	(number)	(percent)
United States	30,822	51.9	30,537	54.0

Quality Metrics for Farm Technology Use – States and United States: 2021 and 2023

State	Coefficient of variation			
	Own or use desktop or laptop computer		Farms with internet access	
	2021	2023	2021	2023
	(percent)	(percent)	(percent)	(percent)
Alabama	8.5	9.2	3.9	4.7
Arizona [1]	15.3	33.6	13.2	16.1
Arkansas	12.3	8.1	7.5	5.2
California	4.1	5.2	3.2	3.0
Colorado	19.9	4.8	5.0	4.0
Florida	12.6	15.3	9.1	5.7
Georgia	7.4	5.2	3.0	3.1
Idaho	5.7	4.9	2.7	2.9
Illinois	3.3	3.7	1.7	2.1
Indiana	6.6	6.9	6.0	6.2
Iowa	3.6	3.4	2.5	2.5
Kansas	3.9	2.8	1.7	2.2
Kentucky	8.8	5.7	3.5	1.5
Louisiana	5.3	18.5	2.3	11.3
Maryland [2]	8.4	9.2	6.7	2.0
Michigan	5.0	4.4	3.4	2.2
Minnesota	4.2	3.3	2.6	2.2
Mississippi	13.1	15.9	7.0	8.0
Missouri	6.4	7.1	2.7	4.0
Montana	4.1	4.6	2.5	2.3
Nebraska	4.4	3.5	2.7	2.4
New Hampshire [3]	7.2	5.4	1.3	3.6
New Jersey	13.8	12.6	13.0	8.0
New Mexico	26.6	18.5	17.6	18.8
New York	10.5	10.1	9.3	8.8
North Carolina	7.9	7.3	5.5	4.0
North Dakota	5.1	3.6	4.1	2.0
Ohio	7.0	5.5	6.0	4.9
Oklahoma	8.9	6.5	3.8	2.9
Oregon	5.1	6.8	2.9	7.3
Pennsylvania	13.7	10.9	10.3	7.8
South Carolina	23.7	10.3	16.5	5.8
South Dakota	4.6	3.9	3.7	2.7
Tennessee	4.3	6.0	3.2	3.8
Texas	4.8	4.6	1.8	2.0
Utah	7.8	6.3	1.6	1.3
Virginia	9.1	9.7	7.0	5.0
Washington	9.8	6.7	9.4	4.4
West Virginia	14.7	9.3	9.1	6.4
Wisconsin	6.5	4.4	4.4	3.6
Wyoming	9.1	21.8	8.0	10.5
United States [4]	1.3	1.2	0.8	0.7

[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 Technology Use – States and United States: 2021 and 2023

State	Coefficient of variation			
	Purchase agricultural inputs over internet		Conduct agricultural marketing activities over internet	
	2021	2023	2021	2023
	(percent)	(percent)	(percent)	(percent)
Alabama	15.1	21.4	20.2	31.3
Arizona [1]	24.6	43.3	49.2	51.7
Arkansas	22.9	14.6	23.3	18.3
California	16.6	11.2	21.3	12.5
Colorado	22.0	11.3	23.9	10.4
Florida	16.4	17.0	26.5	28.1
Georgia	10.6	12.8	21.9	14.8
Idaho	14.3	11.8	19.0	20.3
Illinois	7.8	7.9	7.3	7.3
Indiana	11.6	11.1	13.2	12.4
Iowa	7.5	7.8	7.1	7.7
Kansas	9.8	7.5	11.5	8.2
Kentucky	15.6	10.3	16.8	15.5
Louisiana	17.3	22.6	23.1	16.8
Maryland [2]	16.9	17.6	21.8	21.4
Michigan	14.1	11.1	18.3	15.5
Minnesota	8.9	7.7	8.2	7.0
Mississippi	22.8	35.9	20.8	28.1
Missouri	12.2	13.0	14.4	13.3
Montana	12.7	10.7	13.7	13.3
Nebraska	11.4	11.6	11.2	12.1
New Hampshire [3]	22.6	15.4	31.3	20.0
New Jersey	37.0	21.8	43.1	33.5
New Mexico	46.0	32.2	54.0	49.0
New York	14.8	15.4	21.0	20.7
North Carolina	13.4	12.1	17.4	14.9
North Dakota	10.3	8.1	10.3	8.9
Ohio	10.3	8.9	10.7	9.8
Oklahoma	16.7	12.2	22.0	14.3
Oregon	14.9	17.2	18.9	22.0
Pennsylvania	17.1	18.2	26.0	21.6
South Carolina	58.3	39.0	61.3	45.2
South Dakota	11.0	8.4	11.5	9.3
Tennessee	9.2	13.9	11.5	18.0
Texas	13.3	11.8	15.2	16.0
Utah	11.6	10.0	13.8	13.7
Virginia	19.0	15.7	26.5	23.4
Washington	17.3	16.2	21.5	24.5
West Virginia	34.4	11.8	45.2	24.1
Wisconsin	13.0	11.5	15.9	14.6
Wyoming	24.8	35.5	33.1	51.4
United States [4]	2.6	2.3	3.0	2.6

[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.

Access to NASS Reports

For your convenience, you may access NASS reports and products the following ways:

- All reports are available electronically, at no cost, on the NASS web site: www.nass.usda.gov.

- Both national and state specific reports are available via a free e-mail subscription. To set-up this free subscription, visit www.nass.usda.gov and click on "National" or "State" in upper right corner above "search" box to create an account and select the reports you would like to receive.

- Cornell's Mann Library has launched a new website housing NASS's and other agency's archived reports. The new website, https://usda.library.cornell.edu. All email subscriptions containing reports will be sent from the new website, https://usda.library.cornell.edu. To continue receiving the reports via e-mail, you will have to go to the new website, create a new account and re-subscribe to the reports. If you need instructions to set up an account or subscribe, they are located at: https://usda.library.cornell.edu/help. You should whitelist notifications@usda-esmis.library.cornell.edu in your email client to avoid the emails going into spam/junk folders.

For more information on NASS surveys and reports, call the NASS Agricultural Statistics Hotline at (800) 727-9540, 7:30 a.m. to 4:00 p.m. ET, or e-mail: nass@usda.gov.