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

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Scope and Purpose: Technology Use is estimated biennially in August using data collected on the Agricultural Land Values and Technology Use survey. Estimates made for this program include the percentage of farms that own or use a computer, and percentage 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 percentage of farms using dialup, broadband, cellular, satellite, or other means of accessing the Internet are also estimated. Estimates are published by State, except Alaska and Hawaii, and for the United States. For states with small farm counts, they are instead grouped together.

Survey Timeline: Data collection is conducted by mail and phone interview from the end of April through early July. The reference date for the Agricultural Land Values and Technology Use Survey is April 1. Regional Field Offices conduct editing and analysis from early May though the end of data collection. Once editing is complete, the data are summarized. Survey results are reviewed, and State and National estimates are established and published in August in odd numbered years.

Sampling: The target population for the Agricultural Land Values and Technology Use Survey is all US farms and ranches (excluding Alaska and Hawaii) with at least one acre of agricultural land and $1,000 or more in actual or potential agricultural sales. The Agricultural Land Values and Technology Use sampling frame comprises all active operations in the contiguous 48 states on NASS's List Frame that have at least one acre of total land, pastureland, and/or cropland and at least $1,000 of farm value of sales. A stratified sample is drawn using state and county group as strata. County groups are created using 2022 Census of Agriculture county average land value per acre as a measure of size. The sample size for the 2025 Agricultural Land Values and Technology Use Survey is approximately 29,000.

Data Collection: All Regional Field Offices (RFO) use the same standardized questionnaire for data collection. For consistency across modes, the paper version is considered the master questionnaire and the Computer Assisted Self Interview (CASI), mobile Computer Assisted Telephone Interview (mCATI), and Computer Assisted Telephone Interview (CATI) instruments are built to model the paper questionnaire. The 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. If there are significant changes to either the content or format proposed, a NASS survey methodologist will pre-test the changes for usability. Prior to the start of data collection, all modes of instruments are reviewed, and CASI, mCATI, and CATI instruments are thoroughly tested.

All federal data collections require approval by the Office of Management and Budget (OMB). NASS must document the public need for the data, apply sound statistical practice, prove the data does not already exist elsewhere, and ensure the public is not excessively burdened. The questionnaires 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 be protected from disclosure, and a statement saying that response to the survey is voluntary and not required by law.

Sampled operations receive a cover letter with the questionnaire mailing explaining the survey and providing instructions for completing the survey (via CASI) on the internet. The letter also notifies them that they will be contacted for survey purposes only if they do not return the questionnaire by mail or complete the survey on the web. All modes of data

collection, except face-to-face enumeration, are utilized for each survey. Data collection is coordinated for any sampled operations that are in multiple on-going surveys.

Survey Edit: As survey data are collected and captured, data are edited for consistency and reasonableness using automated systems. The edit logic ensures administrative coding follows the methodological rules associated with the survey design. Relationships between data items 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. Only records that pass edit requirements are eligible for final summary.

Analysis Tools: Edited data are processed through an interactive analysis tool which displays data for all reports by item. The tool provides scatter plots, tables, charts, and special tabulations that allow the analyst to compare an individual record to similar records. Outliers and unusual data relationships become evident, and RFO and Headquarters (HQ) staff review them to determine if they are correct. The tool allows comparison to an agricultural operation's previously reported data to detect large changes in the operation. Data found to be in error are corrected, while accepted data are retained.

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: Response to the Agricultural Land Values and Technology Use 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 partial responses, missing data are imputed by forming similar groups based on geography, type of farm, and size of farm. Using a hot deck procedure, imputed values are randomly selected from responding records within each group. Unit nonresponse is accounted for by adjusting the 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: When all samples are accounted for, all responses are fully edited, and the analysis material reviewed, a summary is executed that generates state level totals and ratios. 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 HQ subject matter specialist for review and acceptance. 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.

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

Survey Methodology for Technology Use Prior to 2025: Prior to 2025, technology use data were collected biennially by NASS as part of the June Area Survey. More information on the methodology and quality measures for technology use in previous survey cycles can be found on the NASS Methodology and Quality Measures webpage for Technology Use at: https://www.nass.usda.gov/Publications/Methodology_and_Data_Quality/Computer_Usage/index.php

Quality Metrics for Technology Use

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 metric 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.

Sample Size is the number of observations selected from the population to represent a characteristic of the population. Operations that did not have the item of interest or were out of business at the time of data collection have been excluded.

Response rate is the proportion of the above sample that completed the 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.

Agricultural Land Values and Technology Use 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.

Agricultural Land Values and Technology Use Survey Sample Size and Response Rates – United States: 2023 [1] and 2025

	2023	2023	2025	2025
	Sample size	Response rate	Sample size	Response rate
	(number)	(percent)	(number)	(percent)
United States	30,537	54.0	28,475	35.8

[1] 2023 sample size and response rate are from the June Area survey.

Quality Metrics for Farm Technology Use – States and United States: 2023 and 2025

State	Coefficient of variation			
	Own or use desktop or laptop computer		Farms with internet access	
	2023	2025	2023	2025
	(percent)	(percent)	(percent)	(percent)
Alabama	9.2	7.1	4.7	4.3
Arizona [1]	33.6	4.3	16.1	3.4
Arkansas	8.1	6.3	5.2	3.9
California	5.2	2.2	3.0	1.9
Colorado	4.8	3.6	4.0	2.4
Florida	15.3	8.8	5.7	5.7
Georgia	5.2	4.9	3.1	3.1
Idaho	4.9	2.9	2.9	1.8
Illinois	3.7	3.4	2.1	2.1
Indiana	6.9	4.7	6.2	3.1
Iowa	3.4	3.2	2.5	2.0
Kansas	2.8	3.5	2.2	1.9
Kentucky	5.7	5.7	1.5	3.8
Louisiana	18.5	7.3	11.3	3.1
Maryland [2]	9.2	5.0	2.0	2.9
Michigan	4.4	5.9	2.2	3.4
Minnesota	3.3	3.5	2.2	2.2
Mississippi	15.9	6.0	8.0	2.9
Missouri	7.1	4.6	4.0	2.8
Montana	4.6	2.5	2.3	1.8
Nebraska	3.5	3.8	2.4	2.3
New Hampshire [3]	5.4	2.3	3.6	1.6
New Jersey	12.6	6.7	8.0	5.1
New Mexico	18.5	4.6	18.8	2.8
New York	10.1	6.1	8.8	4.1
North Carolina	7.3	5.7	4.0	3.0
North Dakota	3.6	3.2	2.0	1.5
Ohio	5.5	3.8	4.9	2.4
Oklahoma	6.5	4.3	2.9	2.2
Oregon	6.8	3.7	7.3	1.8
Pennsylvania	10.9	7.6	7.8	5.5
South Carolina	10.3	5.6	5.8	3.2
South Dakota	3.9	3.4	2.7	2.0
Tennessee	6.0	5.1	3.8	3.0
Texas	4.6	3.4	2.0	2.1
Utah	6.3	3.5	1.3	2.0
Virginia	9.7	7.3	5.0	4.6
Washington	6.7	5.5	4.4	4.1
West Virginia	9.3	9.0	6.4	4.5
Wisconsin	4.4	5.0	3.6	3.4
Wyoming	21.8	5.6	10.5	2.5
United States [4]	1.2	0.8	0.7	0.5

[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: 2023 and 2025

State	Coefficient of variation			
	Purchase agricultural inputs over internet		Conduct agricultural marketing activities over internet	
	2023	2025	2023	2025
	(percent)	(percent)	(percent)	(percent)
Alabama	21.4	9.7	31.3	17.3
Arizona [1]	43.3	6.9	51.7	11.0
Arkansas	14.6	8.1	18.3	11.8
California	11.2	5.1	12.5	9.5
Colorado	11.3	6.0	10.4	9.8
Florida	17.0	10.7	28.1	21.6
Georgia	12.8	7.6	14.8	14.3
Idaho	11.8	4.9	20.3	7.7
Illinois	7.9	5.6	7.3	6.7
Indiana	11.1	6.4	12.4	9.3
Iowa	7.8	5.6	7.7	6.3
Kansas	7.5	5.7	8.2	7.9
Kentucky	10.3	7.5	15.5	11.8
Louisiana	22.6	11.0	16.8	18.6
Maryland [2]	17.6	8.6	21.4	15.5
Michigan	11.1	7.3	15.5	12.0
Minnesota	7.7	5.5	7.0	6.8
Mississippi	35.9	7.3	28.1	12.6
Missouri	13.0	6.4	13.3	9.8
Montana	10.7	4.2	13.3	6.4
Nebraska	11.6	6.3	12.1	7.6
New Hampshire [3]	15.4	3.5	20.0	7.0
New Jersey	21.8	10.2	33.5	26.6
New Mexico	32.2	6.4	49.0	12.2
New York	15.4	6.4	20.7	10.5
North Carolina	12.1	6.6	14.9	12.3
North Dakota	8.1	5.8	8.9	6.5
Ohio	8.9	5.1	9.8	8.3
Oklahoma	12.2	5.7	14.3	9.2
Oregon	17.2	6.2	22.0	10.9
Pennsylvania	18.2	9.8	21.6	20.7
South Carolina	39.0	8.5	45.2	17.3
South Dakota	8.4	5.9	9.3	7.6
Tennessee	13.9	6.5	18.0	11.6
Texas	11.8	4.9	16.0	8.3
Utah	10.0	4.7	13.7	8.1
Virginia	15.7	9.5	23.4	14.2
Washington	16.2	9.3	24.5	12.5
West Virginia	11.8	11.0	24.1	24.5
Wisconsin	11.5	7.4	14.6	11.7
Wyoming	35.5	9.3	51.4	14.1
United States [4]	2.3	1.2	2.6	1.8

[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.

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- All reports are available electronically, at no cost, on the NASS web site: www.nass.usda.gov.
- The national 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" in upper right corner above "search" box to create an account and select the reports you would like to receive.
- Cornell's Mann Library website houses NASS's and other agency's archived reports at https://usda.library.cornell.edu. All email subscriptions containing reports will be sent from https://usda.library.cornell.edu. To receive the reports via e-mail, you will have to go to the website and 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.

If you have specific questions you would like an expert to respond to, please visit our "Ask A Specialist" website at www.nass.usda.gov/Contact_Us/Ask_a_Specialist.