



Cash Rents Methodology and Quality Measures

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Cash Rents Survey Methodology

Scope and Purpose: The Cash Rents Survey is conducted not less than every other year and the June Area Survey is conducted annually. Both surveys obtain acres rented and cash rental rates from farmers and ranchers in the United States excluding Alaska. These surveys provide the basis for estimates of the current year's cash rents paid for irrigated cropland, non-irrigated cropland, and permanent pastureland. Estimates of irrigated and non-irrigated pastureland are not established due to the scarcity of irrigated pastureland. State, district, and county level cash rent estimates are published, pending compliance with disclosure rules and publication standards. When the Cash Rents Survey is not conducted (2015 and 2018), the national and state level estimates are established based on data from the June Area survey only.

The cash rents estimates derived from these surveys supply basic information needed by farmers to make decisions for both short-term and long-term planning. These estimates may be used by individual producers in planning for their agricultural operation or by Agricultural Extension Services or university staff in developing operating budgets for agricultural operations in their locale.

The United States Department of Agriculture's National Agricultural Statistics Service (NASS) was directed through the 2008 Farm Bill as amended by the Agricultural Act of 2014 to collect cash rents data for use by the Farm Service Agency (FSA) in program administration. The amended Food, Conservation, and Energy Act of 2008, Section 2110, states, "The Secretary (acting through the National Agricultural Statistics Service) shall, not less frequently than once every other year, conduct a survey of per acre estimates of county average market dry land and irrigated cash rental rates for cropland and pastureland in all counties or equivalent subdivisions within each state that have 20,000 acres or more of cropland and pastureland."

Survey Timeline: The Cash Rents Survey data collection period begins in mid-February and ends in early July. Data collection is coordinated with other surveys being conducted during this period. Also during June, cash rents data are collected on the June Area Survey. National and state level cash rents estimates are published in August for all states, excluding Alaska. District and county level cash rents estimates are published in September.

Sampling: The target population for the cash rents estimate program is all farms and ranches with \$1,000 or more in agricultural sales (or potential sales) who rent land from others on a cash rent basis. The Cash Rent Survey sample is selected from a list frame of farm and ranch operators maintained by NASS. NASS is constantly seeking qualifying farming operations from outside sources to be added to the list. A profile, known as control data, of each operation is maintained which indicates what the farm has historically produced and a general indication of size. This information allows NASS to define sampling populations that are specific to each survey and employ advanced and more efficient sample designs.

Samples for the Cash Rents Survey are drawn with a county level stratified design to produce state, district, and county level estimates. Large operations in each county are stratified into the census strata, where all are included in the sample. The national sample size for the Cash Rents Survey is approximately 280,000.

The June Area Survey utilizes an area sampling frame for national and state level estimates. The area frame contains all land in the United States (except Alaska) and is therefore complete for the cash rents program. 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 about 10,000.

Data Collection: 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 Cash Rents 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 that response to the survey is voluntary and not required by law.

Data collection for the Cash Rents Survey is mainly conducted by mail and telephone. The initial mail-out occurs in mid-February followed by a second mailing in early April. A letter is enclosed with the questionnaire for the respondent to complete and return by mail. The questionnaire can also be completed securely online. Non-response phone follow-up is conducted using Computer Assisted Telephone Interviews (CATI) at Data Collection Centers from April to July. Personal interviews are limited to large operations or those with special handling arrangements, with data collected on either a paper form or by a Computer-Assisted Personal Interviewing (CAPI) instrument.

Data collection for the June Area Survey is conducted by a personal interview. Enumerators must account for all operations and land contained in their assigned segments. Enumerators interview and collect responses from the end of May through mid-June. Survey questionnaires are returned to Regional Field Offices (RFOs) where they are visually reviewed and key entered.

Survey Edit: As survey data are collected and captured, they 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 and, in certain situations, items are compared to data from earlier surveys to make sure certain relationships are logical. The edit determines the status of each record to be either "dirty" or "clean". Dirty records must be updated and re-edited, or certified by an analyst to be accurate. Corrected data are re-edited interactively. Only clean records are eligible for analysis tools and 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 other similar records within their state. Outliers and unusual data relationships become evident and Regional Field Office staff will review them to determine if they are correct. The tool also allows comparison to previously reported data to detect large changes in the operation. Suspect data found to be in error are corrected, while data found to be correct are kept.

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

Nonresponse Adjustment: Response to the Cash Rents Survey and 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 cash rental rates are to be made. For the Cash Rents Survey, nonresponse adjustments are made through rereighting techniques applied to the data from reporting farms and ranches.

For the June Area Survey, item level nonresponse is accounted for by imputing data where there are missing values. Imputed values are calculated through an automated imputation algorithm that requires a minimum of five complete reports within the imputation group to calculate the imputed value. When a group lacks a sufficient number of responses, groups are collapsed according to a defined hierarchy, preserving as much of the homogeneity as possible, until five complete reports are identified. The first imputation group is reports within the same segment. If five complete reports are not found, the imputation algorithm then moves on to reports within the same county and similar strata, then all reports in the same county, followed by all reports in the same district, and lastly, all reports in the state.

Estimators: The Cash Rents Survey uses a “reweighted” estimator to compute direct measures of acres rented for cash. Each farm and ranch in the sample has an initial sampling weight. This is the inverse of the sampling fraction. For example, if a stratum has 1,000 farms in the population and 200 are sampled for this survey, each sampled farm has a weight of five. In other words, each sampled farm represents five farms. The reweighted estimator uses a global weight adjustment across all usable reports. Using the previous example, if 180 of the original 200 respond, the weights of the 180 will be adjusted to 1,000 divided by 180, or 5.56.

Point estimates, called direct expansions, are calculated by multiplying the reported value by the nonresponse-adjusted weight and summing to a stratum total. A variance estimate is also computed at the stratum level. Totals and variances are additive across strata to form a state estimate and states are additive to national estimates.

Ratio estimates are also computed for many items. For example, cash rent per acre values are calculated as the ratio of total rent paid to total acres rented. Ratio indications use the reweighted estimator described above for the numerator and denominator direct expansions. Both the numerator and denominator must be usable in order for that record to be used in the ratio estimator.

The June Area Survey uses an area frame ratio estimator that calculates the weighted average rental rate by taking the ratio of total rent paid to total acres rented. Cash rent items pertain to the entire farm level and are weighted by the original segment sampling weight and by the proportion of the farm residing inside the segment boundaries. Ratio indications are calculated including and excluding imputed data.

Estimation: When all samples are accounted for, all responses fully edited, and the analysis material reviewed, each RFO executes summaries that generate state, district, and county level totals and ratios. The summary results provide multiple point and ratio estimates and information used to assess the performance of the survey and evaluate the quality of the survey estimates. RFOs are responsible for performing a detailed review of their survey data, interpreting the Cash Rent Survey and June Area Survey indications, and submitting state level estimate recommendations to HQ. Staff must provide justification to the Agricultural Statistics Board (ASB) in cases where recommendations deviate from survey results. The ASB reviews all state, district, and county level recommendations and establishes official estimates.

Quality Metrics for the Cash Rents Survey

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 non-sampling error. The measurement of error due to sampling in the current period is evaluated by the coefficient of variation for each estimated item. Non-sampling 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 sample segments in the June Area Survey excluding tracts on American Indian Reservations in Arizona, Nevada, New Mexico, and Utah and tracts in public and non-agricultural land use strata in all States.

Response rates measure the proportion of the farm tracts in the land values sample that responded 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 precision of the results of a survey estimator.

June Area Survey Cash Rents Sample Size and Response Rates: To assist in evaluating the performance of the cash rents estimates, 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.

Cash Rents Quality Measures – States and United States: 2018

State	Sample Size	Response Rate	Coefficient of variation		
			Irrigated cropland	Non-irrigated cropland	Pastureland
	(number)	(percent)	(percent)	(percent)	(percent)
Northeast	1,308	71.6	13.4	7.8	4.6
Connecticut	19	63.2	(NA)	(NA)	(NA)
Delaware	51	60.8	(NA)	5.6	(NA)
Maine	70	68.6	(NA)	(NA)	(NA)
Maryland	152	75.7	(NA)	6.1	2.5
Massachusetts	31	51.6	(NA)	(NA)	(NA)
New Hampshire	25	68.0	(NA)	(NA)	(NA)
New Jersey	130	68.5	(NA)	11.2	10.4
New York	269	69.1	6.4	(NA)	6.6
Pennsylvania	437	76.2	10.1	(NA)	11.4
Rhode Island	24	41.7	(NA)	(NA)	(NA)
Vermont	100	80.0	32.4	(NA)	(NA)
Lake	2,721	77.1	7.7	(NA)	(NA)
Michigan	587	72.1	(NA)	2.4	3.9
Minnesota	1,340	78.7	9.8	12.9	2.1
Wisconsin	794	78.2	13.8	15.7	3.5
Corn Belt	5,853	71.4	6.5	3.2	0.7
Illinois	1,356	70.8	3.4	3.4	1.4
Indiana	815	68.7	10.3	1.2	1.1
Iowa	1,520	77.6	10.1	2.5	0.8
Missouri	1,352	57.6	3.8	5.1	2.0
Ohio	810	86.4	20.9	0.1	2.3
Northern Plains	4,524	60.3	2.9	1.6	2.6
Kansas	1,249	50.1	4.0	3.1	4.1
Nebraska	1,166	63.6	7.8	1.3	10.7
North Dakota	1,238	67.6	3.9	3.1	2.0
South Dakota	871	60.0	6.8	2.5	2.7
Appalachian	2,620	76.5	7.9	6.7	2.6
Kentucky	541	69.5	8.0	2.4	3.2
North Carolina	668	73.4	8.0	8.7	3.0
Tennessee	872	81.1	15.4	1.1	4.3
Virginia	355	72.1	9.6	8.6	3.1
West Virginia	184	94.6	2.8	(NA)	11.3

(NA) Not available.

Cash Rents Quality Measures – States and United States: 2018 (continued)

State	Sample Size	Response Rate	Coefficient of variation		
			Irrigated cropland	Non-irrigated cropland	Pastureland
	(number)	(percent)	(percent)	(percent)	(percent)
Southeast	1,381	72.6	4.4	3.2	2.5
Alabama	492	83.7	6.1	10.2	4.9
Florida	202	67.8	2.5	7.8	3.6
Georgia	463	62.6	5.7	2.5	4.4
South Carolina ...	224	73.2	3.2	8.9	5.8
Delta	1,693	86.3	8.0	1.3	2.9
Arkansas	673	85.4	19.8	2.4	9.9
Louisiana	481	86.3	8.3	2.8	4.9
Mississippi	539	87.4	10.6	1.6	3.9
Southern Plains	3,853	74.2	37.9	6.1	3.3
Oklahoma	884	59.3	4.8	6.8	2.8
Texas	2,969	78.7	40.3	5.7	4.7
Mountain	2,646	71.3	11.0	5.1	3.7
Arizona	232	80.2	(NA)	16.9	(NA)
Colorado	539	62.3	6.5	4.7	4.6
Idaho	431	70.3	8.9	4.6	13.4
Montana	742	78.7	17.4	4.0	3.2
Nevada	19	89.5	(NA)	17.5	(NA)
New Mexico	254	55.1	(NA)	8.0	(NA)
Utah	269	82.9	19.9	7.6	2.5
Wyoming	160	61.3	3.6	3.3	(NA)
Pacific	1,380	70.4	12.4	18.0	5.9
California	540	73.3	14.9	22.5	19.4
Oregon	391	72.4	5.8	16.4	10.4
Washington	449	65.0	24.9	10.1	5.4
United States	27,979	71.9	22.8	7.8	1.0

(NA) Not available.

Information Contacts

Listed below are the commodity statisticians in the Environmental, Economics, and Demographics Branch of the National Agricultural Statistics Service to contact for additional information. E-mail inquiries may be sent to nass@nass.usda.gov.

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