



ISSN: 2167-132X

Farms, Land in Farms, and Livestock Operations Methodology and Quality Measures

Released February 19, 2013, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA).

Survey Methodology for Farms and Land in Farms

Scope and Purpose: Farms and land in farms are estimated annually in February. Estimates made for this program include the number of farms, land in farms, and average farm size. Estimates are published for the United States and by State and economic sales class.

The 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.

Survey Timeline: Some presurvey 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. Field Offices (FOs) conduct the first round of editing and analysis over a three-week period, ending in late June. An additional two weeks of editing and analysis occur in July. Once editing is complete, the data are summarized. Following summarization, FOs review the survey results and submit State level recommendations to NASS headquarters. A national review is completed and national estimates are established. The Farm Numbers and Land in Farms estimates are published annually in mid-February.

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 about 11,000. The cost of building the frame and preparing materials for enumeration is significant, so sampled segments are in the survey for five consecutive years. About 20 percent of the segments are rotated out and replaced with new ones each year.

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 farm numbers.

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 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. If there are significant changes to either the content or format proposed, a NASS survey methodologist will pre-test the changes for usability.

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: 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. Only records that pass edit requirements are eligible for final summary.

Analysis Tools: Edited June Area 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. Atypical responses and unusual data relationships become evident and Field Office 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.

Nonresponse Adjustment: 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 farm numbers are to be made. The nonresponse data items and sampling units are manually imputed by Field Office statisticians, largely by observation. The weights for data items from reporting farms and ranches are not adjusted.

Estimators: The primary estimators used to set farms and land in farms estimates are the area frame direct expansion and ratio estimators. The direct expansion generates a total for the current year. It is calculated by summing the June Area Survey data multiplied by the proportion of the farm residing inside the segment and weighted by the original segment sampling weight. The ratio estimator measures the change from year to year and is the ratio of the current year's and previous year's direct expansions for comparable segments. The sampling weights are adjusted to account for those segments that are not comparable.

A multiple frame direct expansion is also generated for farms and land in farms. It is the sum of direct expansion from the June Agricultural Survey data, a NASS list only survey, and the nonoverlap (NOL) portion of the direct expansion from the June Area Survey data. The NOL portion of the June Area Survey refers to those operations identified on the area frame that are not matched to an operation eligible for sampling for the June Agricultural Survey.

Estimation: The number of farms and land in farms data are summarized from the June Area dataset. Since all FOs conduct identical surveys, the State data can be summarized and national survey point estimates, or indications, computed. FOs are responsible for performing a detailed review of the survey data. Any irregularities revealed by the analysis must be investigated and, if necessary, resolved. The summary results provide multiple direct and ratio indications for each data series being estimated. It also provides information used to assess the performance of the current survey and evaluate the quality of the survey indications. FOs interpret the survey indications and submit State recommendations to NASS headquarters, providing justification in cases where recommendations deviate from survey results.

For the national estimates, NASS assembles a panel of statisticians to serve as the Agricultural Statistics Board which reviews the national results and establishes the national estimates. Since larger sample sizes yield more precise results,

NASS employs the “top-down” approach by determining the national estimates first and reconciling the state recommendations to the national number for total number of farms and land in farms, as well each of the economic sales classes. The Board also enjoys an advantage in being able to examine results across states, and compare the state recommendations. The same estimators used in the state summaries are produced by the national summary. The Board follows the same approach the states do in determining the national estimate. The historical relationship of the survey estimates to the official estimate is evaluated to determine accuracy and bias using tables and graphs. Each Board member completes an independent interpretation of the survey results which are shared with the other members and a consensus is reached. Often the state recommendations do not sum to the national estimate. Board members must reexamine the state results and revise some states to make the sum of the state estimates agree with the national estimate.

Quality Metrics for Farm Numbers and Land in Farms

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 in this document 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.

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 precision of the results of a survey estimator.

June Area Survey Farm Numbers and Land in Farms Sample Size and Response Rates: To assist in evaluating the performance of the estimates in the *Farms, Land in Farms, and Livestock Operations* 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.

Survey Methodology for Livestock Operations

Detailed information on survey methodology for livestock operations can be found in previously released Methodology and Quality Measures reports for Cattle, Hogs, and Sheep and Goats. Data in this publication *Land, Land in Farms and Livestock Operations Methodology and Quality Measures* pertaining to Livestock Operations can be found in *Cattle Methodology and Quality Measures* released on February 1, 2013, *Quarterly Hogs and Pigs Methodology and Quality Measures* released on December 28, 2012, and *Sheep and Goats Methodology and Quality Measures* released on February 1, 2013. Links to all Data Quality Measures reports can be found on the NASS website www.nass.usda.gov under the Publications tab and then clicking on Data Quality Measures. Additional data not published in the previously mentioned reports can be found on page 7 of this release.

Farms and Land in Farms Sample Size and Response Rate – States and United States: 2011-2012

State	Sample size		Response rate	
	2011 (number)	2012 (number)	2011 (percent)	2012 (percent)
Alabama	651	633	91.6	88.3
Alaska	(NA)	(NA)	(NA)	(NA)
Arizona	315	309	90.2	91.9
Arkansas	1,095	1,026	85.1	80.9
California	931	856	75.3	75.0
Colorado	697	748	64.3	63.5
Connecticut	32	32	59.4	78.1
Delaware	119	117	84.0	73.5
Florida	358	296	84.9	89.2
Georgia	735	775	76.2	81.3
Hawaii	(NA)	(NA)	(NA)	(NA)
Idaho	520	562	75.0	79.9
Illinois	1,991	2,007	80.0	79.6
Indiana	1,245	1,245	69.3	76.9
Iowa	2,030	2,046	83.1	82.5
Kansas	1,555	1,577	66.6	58.9
Kentucky	811	841	85.3	76.6
Louisiana	756	736	85.7	86.0
Maine	106	104	73.6	67.3
Maryland	214	216	82.7	81.9
Massachusetts	83	81	85.5	63.0
Michigan	712	697	75.3	79.6
Minnesota	1,783	1,720	79.4	80.2
Mississippi	892	870	92.5	93.7
Missouri	1,671	1,685	72.2	69.2
Montana	948	973	78.4	82.0
Nebraska	1,604	1,619	70.0	67.8
Nevada	39	39	89.7	92.3
New Hampshire	17	19	100.0	94.7
New Jersey	190	177	79.5	82.5
New Mexico	534	518	76.6	76.6
New York	299	294	80.3	79.3
North Carolina	1,077	1,081	83.4	78.4
North Dakota	1,389	1,317	71.2	74.7
Ohio	1,047	1,046	71.9	77.2
Oklahoma	1,138	1,122	70.3	70.1
Oregon	568	552	82.7	82.4
Pennsylvania	703	694	85.9	78.8
Rhode Island	25	28	80.0	82.1
South Carolina	347	321	83.9	84.1
South Dakota	1,226	1,199	77.6	73.0
Tennessee	1,189	1,121	89.9	99.0
Texas	4,447	4,237	86.6	85.7
Utah	259	223	82.6	81.2
Vermont	112	134	82.1	88.1
Virginia	591	552	89.5	85.7
Washington	686	697	74.8	71.9
West Virginia	403	360	85.9	86.4
Wisconsin	915	894	86.7	88.0
Wyoming	199	177	77.4	62.7
United States	39,254	38,573	79.5	78.9

(NA) Not available.

Quality Metrics for Farms and Land in Farms – States and United States: 2011 and 2012

States	Coefficients of variation			
	Farms		Land in farms	
	2011	2012	2011	2012
	(number)	(number)	(number)	(number)
Alabama	9.7	9.0	6.6	6.6
Alaska	(NA)	(NA)	(NA)	(NA)
Arizona	17.7	21.6	5.3	3.8
Arkansas	8.5	8.9	4.2	4.3
California	12.9	13.7	9.6	9.5
Colorado	11.8	9.6	10.9	4.9
Connecticut	34.6	32.0	38.8	32.0
Delaware	26.0	22.6	8.0	6.4
Florida	15.4	16.4	12.8	11.2
Georgia	10.4	10.3	5.7	5.5
Hawaii	(NA)	(NA)	(NA)	(NA)
Idaho	14.4	11.8	7.9	14.2
Illinois	5.7	5.5	1.1	1.2
Indiana	5.8	5.9	2.2	2.0
Iowa	3.2	3.3	1.2	1.2
Kansas	5.3	5.7	1.5	1.4
Kentucky	6.4	6.5	4.7	4.6
Louisiana	10.6	8.6	4.5	4.6
Maine	25.0	23.3	19.5	18.8
Maryland	12.9	12.6	7.4	8.2
Massachusetts	15.1	15.6	27.3	28.7
Michigan	8.4	8.7	3.5	3.9
Minnesota	4.6	4.4	2.3	2.3
Mississippi	6.5	6.5	3.8	4.1
Missouri	5.5	5.6	3.4	3.4
Montana	13.2	11.0	2.9	3.1
Nebraska	3.6	3.7	0.8	1.2
Nevada	48.2	54.0	5.1	15.3
New Hampshire	50.6	40.7	77.2	51.1
New Jersey	12.5	12.2	9.5	9.7
New Mexico	15.0	15.3	14.6	13.4
New York	14.8	17.4	7.6	8.2
North Carolina	6.1	5.7	3.9	4.0
North Dakota	4.2	4.3	1.9	1.9
Ohio	6.9	7.6	2.6	2.7
Oklahoma	5.9	6.3	2.2	2.1
Oregon	14.8	21.9	8.9	14.1
Pennsylvania	7.3	6.9	5.7	5.8
Rhode Island	18.7	23.9	48.6	39.9
South Carolina	11.7	11.1	10.9	8.9
South Dakota	5.1	4.7	1.2	1.2
Tennessee	5.0	4.9	3.7	3.9
Texas	3.9	4.2	1.1	2.7
Utah	21.4	24.4	62.2	70.2
Vermont	18.5	18.1	17.8	15.5
Virginia	8.1	9.3	7.1	7.2
Washington	10.8	11.1	5.7	5.8
West Virginia	10.3	10.3	12.4	8.6
Wisconsin	6.2	5.4	3.6	2.8
Wyoming	17.6	17.3	12.7	14.9
United States	1.3	1.4	1.2	1.2

(NA) Not available.

Quality Metrics for Farms and Land in Farms by Economics Sales Class – United States: 2011-2012

Economic sales class	Coefficients of variation			
	Farms		Land in farms	
	2011	2012	2011	2012
	(number)	(number)	(number)	(number)
\$1,000 - \$9,999	2.0	2.2	2.7	4.0
\$10,000 - \$99,999	1.9	1.9	4.1	4.5
\$100,000 - \$249,999	2.7	2.6	3.8	4.5
\$250,000 - \$499,999	2.5	2.6	3.1	3.7
\$500,000 and over	2.0	1.9	2.4	2.2
Total	1.3	1.4	1.2	1.2

Livestock Operations Sample Size, Response Rate, and Coefficient of Variation - United States: January 1, 2012 and 2013

	Sample Size		Response Rate		Coefficient of variation	
	2012 (number)	2013 (number)	2012 (percent)	2013 (percent)	2012 (percent)	2013 (percent)
All Cattle	40,138	39,646	76.6	76.7	0.8	0.9
Beef Cows	40,138	39,646	76.6	76.7	1.1	1.0
Milk Cows	40,138	39,646	76.6	76.7	1.3	1.0
Hogs and Pigs ¹	10,725	10,390	79.0	77.1	5.6	5.4
Based on Ownership ¹	10,725	10,390	79.0	77.1	4.7	4.5
Sheep	23,031	22,974	77.2	75.3	2.1	2.0
All Goats	23,031	22,974	77.2	75.3	3.0	3.7

¹ December 1 preceding year

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Analysis and Estimators	Statistical Methods Branch	(202) 720-4008	HQ_SD_SMB@nass.usda.gov
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