



Milk Production Methodology and Quality Measures

ISSN: 2167-1885

Released August 28, 2025, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board, United States Department of Agriculture (USDA).

Scope and Purpose: The Milk Production Survey, conducted in all states in January, April, July, and October, collects data for the number of all milk cows in the herd, number of cows milked on the first day of the survey month, and total milk produced on the first day of the survey month. In addition, milk cow replacement prices are collected each quarter and heifer replacement prices are collected in January. In April and October, producers are asked to report the amount of milk used on the farm for food or drink and the amount fed to calves.

Survey Timeline: The reference date for the Milk Production Survey is the 1st day of each quarter (January, April, July, and October), with a data collection period of approximately 15 calendar days. Regional Field Offices (RFOs) may begin data collection one day prior to the reference date. Data collection continues until a scheduled ending date, and RFOs have four to five business days to complete editing and analysis, execute the summary, and interpret the survey results. The National milk production statistician must review the State estimates and prepare the official estimates for release in about four business days. *Milk Production*, usually released around the 18th or 19th of each month, includes monthly estimates of milk production, milk per cow, and number of milk cows for the 24 major States. Quarterly estimates of milk production and number of milk cows are published for all states in the January, April, July, and October *Milk Production* publications. Annual milk production revisions are published for all states in February.

Sampling: The target population for the Milk Production Survey is all agricultural establishments with one or more head of milk cows on the land operated. The Milk Production Survey is conducted in every state.

NASS uses the list frame for the Milk Production Survey. The list frame includes all known agricultural establishments. Livestock inventory of each establishment is maintained on the list frame to allow NASS to define list frame sampling populations for specific surveys and to employ efficient sampling designs. Only list frame records with positive milk cow inventory data are included in the Milk Production list frame population.

The sample size for the Milk Production Survey is approximately 11,000, though some operations will be found to be out of business or not to have the item of interest. The sample is selected using a stratified sampling design with strata defined by the total number of milk cows. The sample is first used in the January survey quarter or the "base" survey quarter, which is the initial quarter of the survey year. The "follow-on" quarters in the survey year use the same "base" sample. New milk operations found during the survey year can be added to the sample if the new operation qualifies for a stratum with a probability of selection equal to 1.

Data Collection and Editing: For consistency across modes, the paper version is considered the master questionnaire and the Computer Assisted Telephone Interview (CATI), Computed Assisted Self Interview (CASI), and Mobile Computer Assisted Personal Interview (mCAPI) instruments are built to model the paper instrument. 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 the paper, mCAPI, CASI, 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 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. Also, 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 must be on the questionnaire.

Sampled farms and ranches receive a presurvey letter explaining the survey and that they will be contacted for survey purposes only. The letter provides the questions to be asked to allow respondents to prepare in advance and also provides a pass code they can use to complete the survey on the internet (CASI). All modes of data collection are utilized for the Milk Production Survey. RFOs are given the option of conducting a mail out/mail back phase. While mail is the least costly mode of collection, the short data collection period and the uncertainty of postal delivery times limit its effectiveness. Most of the data are collected by CATI by individual RFOs and Data Collection Centers. A program is run to determine if any sampled farms are in multiple on-going surveys so data collection can be coordinated.

Survey Edit: As survey data are collected and captured, they are edited for consistency and reasonableness using automated systems. Relationships between data items on the current survey are verified and in certain situations those items may be compared to data from earlier surveys to make sure certain relationships are logical. The edit will determine the status of each record to be either "dirty" or "clean". Dirty records must be updated and reedited or certified by an analyst to be clean. If updates are needed, they are reedited interactively. Only clean records are eligible for analysis 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 RFO 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. 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, 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, detailed computer edits, and evaluation of the data via the analysis tool.

Estimators: Each milk cow farm and ranch in the sample has an initial sampling weight. This weight is the inverse of the sampling fraction. For example, if a milk cow stratum has 1,000 farms in the population and 200 are sampled for this survey, each sampled farm has a weight of 5. In other words, each sampled farm represents 5 farms.

Response to the Milk Production Survey is voluntary. Some producers refuse to participate in the survey. Others cannot be contacted during the data collection period, and some submit incomplete reports. These nonrespondents must be accounted for if accurate estimates of milk are to be made. For the Milk Production Survey, nonrespondents are accounted for by adjusting the weights of the respondents. The adjustment occurs by stratum as the bounded strata represent homogeneous groupings of similar sized milk cow farms. The adjustment is also performed for each individual item (total milk cows, cows milked, milk production) because sometimes only a partial report is obtained. Using the previous example, if 160 of the original 200 respond, the weights of the 160 will be adjusted to 1,000 divided by 160, or 6.25. The largest stratum is unbounded and is made up of operations with a large number of milk cows. Nonrespondents in the unbounded stratum must be manually estimated by RFO statisticians, and their stratum sampling weights are not adjusted.

Two estimators are used to compute direct measures of the milk items. The "reweighted" estimator and the "adjusted" estimator are computationally identical except in how the nonresponse adjustments are made. The reweighted estimator uses a global weight adjustment across all reported and estimated reports. The nonresponse weight adjustment for the adjusted estimator uses an additional piece of information, based on the presence/absence of milk cows. When a sampled farm refuses to cooperate, interviewers can probe to determine the presence of milk cows even though the number of milk cows is not known. Also, automated edit logic that is based on historic and administrative data ensures the coding of the presence indicator value. This presence/absence indicator is used in the weight adjustment.

Point estimates, called direct expansions, for both estimators are calculated by multiplying the reported value by the nonresponse 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 a National estimate.

Ratio estimates are also computed for many items. For example, milk yield is estimated as a ratio of milk production to total milk cows. Ratio estimates use the reweighted estimator described above for the numerator and denominator. Both the numerator and denominator must be complete for that record to be included in the ratio estimator.

Estimation: Indicators from the quarterly Milk Production Survey, along with external information (administrative data) from various sources, provide data for estimating number of milk cows and milk production on a monthly and quarterly basis. To be considered, these administrative data must be deemed to be reliable and come from unbiased sources. The most common administrative data are Federal Milk Marketing Order statistics.

When all Milk Production Survey samples are accounted for, all responses fully edited, and the analysis material is reviewed, each RFO executes a summary for their state. When all RFOs have run summaries, Headquarters executes the National summary. Since all states conduct identical surveys, the samples can be pooled and National survey results computed. The summary results provide point estimates and precision measures for each item being estimated. It also provides information used to assess the performance of the current survey and evaluate the quality of the survey estimates, such as strata level expansions, response rates, and percent of the expansion from usable reports.

RFOs are responsible for performing a detailed review of their survey results. Any irregularities revealed by the summary must be investigated and, if necessary, resolved. Using the historical relationship of the survey estimates to the official estimate, RFOs must interpret the survey results and submit recommended estimates to Headquarters for all milk cows, milk production, and milk per cow. The data are viewed in tabular and graphical form. RFOs see their survey results only and do not have access to other states' results.

The National estimates are determined using the “bottom-up” approach. After the RFOs submit the recommended estimates for each state, the National milk production statistician reviews the individual state estimates for reasonableness. When analyzing the state estimates, the National statistician has an advantage in being able to examine results across states and compare the state recommendations. When the review of the individual state estimates is complete, the National estimates are determined by summing the estimates for each state. The Agricultural Statistics Board reviews the National estimates for reasonableness.

Milk production, milk per cow, and number of milk cows are subject to revision the following month after initial publication for monthly states or the following quarter for the quarterly states. Normally, administrative data from Federal Market Orders, State Departments of Agriculture, or other sources are the main basis for revisions. However, administrative data for all states may not be available in time for these revisions. Estimates are again subject to revision in February each year based on additional administrative data. In the event that additional changes are necessary, a third revision is possible in February the following year.

Every five years, NASS conducts the Census of Agriculture, which is an exhaustive data collection effort for all known farm operations across the United States. Estimates are thoroughly reviewed for possible revision after data from the Census of Agriculture are available. The information gathered from the Census of Agriculture is used to establish benchmark levels by which the survey estimators can be compared, and bias determined. Survey based estimators can also be impacted by outliers – individual reports that have excessive influence on the results due to either improper classification or extremely unusual data for a given operation (i.e., operation is not representative of other operations). NASS thoroughly reviews the survey data to identify these situations and consider their impact on the survey results when establishing the official estimates.

Quality Metrics for Milk Production

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 all surveys 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 and the weighted item response rate.

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.

Weighted item response rate is a ratio of reported survey data expanded by the original sampling weight compared to final nonresponse adjusted summary totals.

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.

Milk Production Survey Sample Size and Response Rate: To assist in evaluating the performance of the estimates in the quarterly milk production report, the sample size and response rate are displayed.

**Milk Production Survey Sample Size and Response Rate – States and United States:
January 1, 2024-2025**

State	Sample size		Response rate	
	2024	2025	2024	2025
	(number)	(number)	(percent)	(percent)
Alabama	41	30	17.1	16.7
Alaska	(D)	(D)	(D)	(D)
Arizona	38	34	50.0	47.1
Arkansas	36	28	25.0	28.6
California	502	488	56.0	62.3
Colorado	92	91	38.0	46.2
Connecticut	57	55	52.6	47.3
Delaware	16	20	56.3	50.0
Florida	68	61	32.4	23.0
Georgia	98	83	32.7	43.4
Hawaii	(D)	(D)	(D)	(D)
Idaho	278	278	39.2	39.9
Illinois	196	197	51.0	54.3
Indiana	276	299	47.5	44.8
Iowa	359	357	42.9	40.1
Kansas	97	106	46.4	37.7
Kentucky	178	186	49.4	55.4
Louisiana	65	58	33.8	39.7
Maine	115	97	40.9	50.5
Maryland	194	194	53.1	34.5
Massachusetts	68	65	57.4	69.2
Michigan	574	570	35.2	39.8
Minnesota	869	840	40.0	36.3
Mississippi	50	42	42.0	26.2
Missouri	188	190	35.6	40.0
Montana	37	36	62.2	63.9
Nebraska	75	67	28.0	29.9
Nevada	28	30	14.3	16.7
New Hampshire	71	76	49.3	53.9
New Jersey	43	50	39.5	38.0
New Mexico	94	86	22.3	25.6
New York	1,399	1,372	38.0	41.2
North Carolina	86	88	59.3	65.9
North Dakota	31	31	51.6	41.9
Ohio	461	487	50.1	43.5
Oklahoma	90	53	17.8	20.8
Oregon	90	89	41.1	47.2
Pennsylvania	1,081	1,102	41.0	50.4
Rhode Island	13	11	15.4	18.2
South Carolina	40	44	47.5	40.9
South Dakota	106	106	47.2	50.9
Tennessee	87	92	42.5	29.3
Texas	327	270	20.8	33.0
Utah	91	90	69.2	74.4
Vermont	258	235	43.8	57.9
Virginia	173	164	41.6	48.2
Washington	176	172	42.6	47.1
West Virginia	35	37	51.4	56.8
Wisconsin	1,468	1,468	44.6	43.5
Wyoming	15	13	60.0	30.8
Other States ¹	18	21	38.9	38.1
United States	10,848	10,659	42.0	44.2

(D) Withheld to avoid disclosing data for individual operations.

¹ Other States includes Alaska and Hawaii.

Quality Metrics for Milk Production Survey - States and United States: January 1, 2024-2025

State	Milk production				Milk cows			
	Weighted item response rate		Coefficient of variation		Weighted item response rate		Coefficient of variation	
	2024	2025	2024	2025	2024	2025	2024	2025
	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)
Alabama	36.2	28.7	11.1	9.7	34.1	32.6	7.4	6.6
Alaska	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Arizona	54.6	61.5	1.5	2.5	51.5	58.2	1.1	2.0
Arkansas	35.8	73.2	18.9	22.6	40.1	62.4	17.7	21.6
California	61.3	70.3	1.6	1.8	61.2	70.3	1.5	1.6
Colorado	47.3	59.8	0.5	0.4	45.7	60.5	0.5	0.7
Connecticut	64.4	61.4	2.1	2.9	62.8	58.5	2.0	4.7
Delaware	48.3	31.5	7.1	7.2	49.2	34.5	5.4	6.5
Florida	43.1	19.8	3.9	2.0	43.1	22.2	3.1	2.9
Georgia	64.9	72.2	1.2	1.2	59.5	64.3	1.7	2.6
Hawaii	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Idaho	38.1	39.7	0.8	0.6	39.4	40.5	1.0	0.4
Illinois	52.2	61.9	3.0	2.4	52.6	60.6	2.8	2.7
Indiana	57.9	27.4	1.1	1.0	56.8	28.5	1.1	1.1
Iowa	38.8	33.4	1.6	1.8	38.8	33.7	1.5	1.7
Kansas	39.4	30.3	1.6	1.6	35.8	29.2	1.4	1.3
Kentucky	66.3	77.7	3.6	2.8	65.4	75.3	3.5	2.8
Louisiana	36.6	70.8	7.8	9.4	36.1	67.1	8.5	16.6
Maine	32.3	53.3	4.2	2.3	34.8	52.4	4.6	3.2
Maryland	48.9	35.3	2.6	5.4	49.3	33.7	2.3	3.8
Massachusetts ..	65.3	72.8	2.7	3.0	64.7	69.9	3.5	3.1
Michigan	27.4	40.2	1.0	0.8	28.5	40.0	1.0	0.8
Minnesota	54.8	55.6	1.2	1.2	55.7	55.2	1.2	1.2
Mississippi	80.9	59.9	6.9	11.9	77.3	55.7	7.5	2.6
Missouri	44.4	63.7	3.9	4.9	40.6	57.7	3.6	4.1
Montana	68.6	55.2	6.0	5.8	68.4	56.2	6.0	6.4
Nebraska	60.7	32.1	3.0	3.1	59.6	32.2	2.8	2.6
Nevada	15.4	0.9	0.5	0.6	14.0	1.3	0.7	0.8
New Hampshire ..	35.7	46.2	5.5	2.1	36.8	46.3	4.3	2.1
New Jersey	56.4	45.4	7.5	9.1	54.0	43.4	7.4	4.7
New Mexico	28.6	34.2	2.5	2.5	26.7	33.5	2.3	2.4
New York	41.4	49.9	0.9	1.2	41.3	48.6	0.9	1.1
North Carolina	52.2	64.6	2.1	1.2	52.5	65.1	2.6	1.5
North Dakota	82.3	66.4	1.3	0.2	80.8	67.1	2.0	0.4
Ohio	41.9	44.2	1.6	1.7	42.5	43.9	1.7	2.0
Oklahoma	8.7	5.5	3.9	2.7	8.9	6.4	3.9	3.2
Oregon	61.0	66.3	2.7	1.9	59.2	66.2	2.2	1.8
Pennsylvania	49.1	57.9	2.3	2.2	49.4	57.7	2.2	2.1
Rhode Island	(Z)	12.1	(Z)	23.3	0.8	11.5	1.2	19.4
South Carolina	49.7	74.8	9.0	5.7	53.9	71.8	9.7	3.6
South Dakota	65.7	71.2	1.6	1.9	68.0	72.7	1.3	1.6
Tennessee	42.4	41.1	11.7	29.5	46.3	42.6	9.4	29.2
Texas	17.6	21.3	1.0	0.7	18.8	20.7	0.8	0.6
Utah	71.6	73.4	0.6	0.7	71.4	73.1	0.6	0.9
Vermont	46.6	62.0	2.5	4.6	45.8	62.1	2.1	3.9
Virginia	42.9	53.0	2.8	3.0	41.8	52.4	2.6	3.0
Washington	32.2	57.8	2.2	1.6	33.8	56.6	1.8	1.5
West Virginia	69.7	53.4	6.8	12.4	74.3	57.5	5.1	7.8
Wisconsin	47.3	47.1	1.2	1.1	47.8	47.2	1.2	1.1
Wyoming	100.0	11.0	0.1	(Z)	98.8	12.3	2.0	0.2
Other States ¹	2.0	85.7	2.0	0.6	4.9	70.7	2.6	1.7
United States	45.8	49.9	0.4	0.4	45.8	49.6	0.4	0.4

(D) Withheld to avoid disclosing data for individual operations.

(Z) Less than half of the unit shown.

¹ Other States includes Alaska and Hawaii.

Information Contacts

Process	Unit	Telephone	Email
Estimation	Livestock Branch	(202) 720-3570	HQ_SD_LB@usda.gov
Data Collection	Survey Administration Branch	(202) 720-3895	HQ_CSD_SAB@usda.gov
Questionnaires	Data Collection Branch	(202) 720-6201	HQ_CSD_DCB@usda.gov
Sampling and Editing	Sampling Editing and Imputation Methodology Branch	(202) 690-8141	HQ_CSD_SB@usda.gov
Summary and Estimators	Summary Estimation and Disclosure Methodology Branch	(202) 690-8141	HQ_SD_SMB@usda.gov
Dissemination	Data Dissemination Office	(202) 720-3869	HQSDOD@usda.gov
Media Contact and Webmaster	Public Affairs Office	(202) 720-2639	HQOAPAO@usda.gov

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.
- 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.

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.