



Honey Methodology and Quality Measures

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Scope and Purpose: The Bee and Honey Inquiry is conducted annually in all States. The target population consists of all known producers with five or more colonies. Data are collected on the following: current year honey production, total colonies, colonies harvested, current year quantity sold, and value of sales for honey produced in the current year and in the previous year, and honey stocks as of December 15. Stocks exclude those held under the commodity loan program. From 2015 to 2018 a separate survey was conducted to collect data on producers with less than five colonies.

Data are summarized for all operations reporting five or more total colonies. If honey stocks or colonies were present in more than one state, each state is counted. Estimates are published for honey producing colonies, yield per colony, production, stocks on December 15, average price per pound, and value of production at a National and State level. The publication contains combined estimates for ten States with low levels of production labeled as “Other States”. Estimates for honey prices by color class and marketing channel are also included in the publication.

Survey Timeline: For the Bee and Honey Inquiry data collection begins in December using the current year as the reference period. Honey Stocks are recorded for a December 15 reference date. Questionnaires are mailed in early December. Telephone follow-up is conducted for nonresponse records beginning in late January. Enumerators at NASS data collection centers collect data for a period of approximately one month. Assigned Regional Field Offices (RFOs) have approximately two weeks from the end of data collection in February to complete editing and analysis, execute the summary, interpret the survey results, and submit recommendations for estimates. Over the next three weeks a National review is completed and National estimates are established. Estimates are released to the public in March as specified by the Agricultural Statistics Board (ASB) on its annual publications calendar.

Sampling: The target population for the Bee and Honey Inquiry is all agricultural operations with five or more total colonies of bees. The number of colonies on each operation is maintained on the NASS List Sampling Frame (hereafter List Frame) to allow NASS to identify operations eligible for sampling. For bee and honey operations, the List Frame is a current and unduplicated list of agricultural operations, and all current bee and honey operations are assumed to be on the list. Each bee and honey operation is classified into one of several mutually exclusive strata based on the number of total colonies controlled by the operation and whether an operation is located in multiple states. Survey samples are selected annually.

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 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.

All RFOs use the same, standardized questionnaire for data collection. For consistency across modes, the paper version is considered the master questionnaire and the web and Computer Assisted Telephone Interview (CATI) 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.

Sampled operations receive a pre-survey letter explaining the purpose and importance of the survey and that they are being contacted for survey purposes only. Attached to the letter is a complete copy of the paper questionnaire and a pass code, which can be used to complete the survey securely online. RFOs are responsible for their data collection strategy, but RFOs must include provisions for respondents to report securely online. If response is not received by mail or online, respondents are contacted by computer-assisted telephone interviews (CATI). Limited personal interviewing may be conducted, generally for large operations or those with special handling arrangements.

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.

During the data edit, operations reporting colonies in more than one state must have a special review completed. A reconciliation review is completed between the sending and receiving States. All RFOs involved must agree upon the allocation of honey amongst states. This reconciliation procedure eliminates duplication and ensures that the honey is recorded in the state in which the honey was harvested or stocks were stored.

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 assigned RFO staff review them to determine if they are correct. The tool allows comparison to an operation’s previously reported data to detect large changes in the operation. Data found to be in error are corrected, while data found to be correct 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 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. The nonrespondents are accounted for in the estimation process.

Estimators: Each bee and honey operation in the sample has an initial sampling weight, which is the inverse of the sampling fraction for the stratum to which the bee and honey operation is assigned. For the Bee and Honey Inquiry, nonrespondents are accounted for in one of two ways. For bee and honey operations in strata made up of large and, often unique, operations production, colonies, stocks, and production sold must be manually imputed. Nonrespondents in all other strata are accounted for by adjusting the weights of the usable responses to account for responses that are not usable. The adjustment occurs at the stratum level for all strata that represent bounded homogenous groupings of similar sized operations. The adjustment is performed for each individual item (number of colonies, honey sales) because sometimes only a partial report is obtained.

Point estimates, called direct expansions, are calculated by multiplying the reported value by the combined nonresponse weight and sampling 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 State estimates are additive to a National estimate.

Ratio estimates are also computed for many items including prices. Ratio estimates use the reweighted estimator described above for the numerator and denominator direct expansions. Both the numerator and denominator must be complete for that record to be included in the ratio estimate.

Estimation: When all samples are accounted, all responses fully edited and the analysis material is reviewed, each assigned RFO executes a summary to evaluate and analyze the data under its responsibility. When all assigned RFOs have run summaries, Headquarters receives all State files and pools the data. Since identical surveys are conducted in each

State, the samples can be pooled and National survey results computed. The summary results provide multiple indications and their standard errors. It also provides information to assess the performance of the current survey and evaluate the quality of survey indications, such as response rates and strata level expansions. 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. Assigned RFOs interpret the survey results and submit a recommended estimate to Headquarters for honey production, honey producing colonies, yield, and stocks. Price and value of production estimates are set at the state level with US estimates summed from each State. NASS assembles a panel of statisticians to serve as the ASB, which reviews the National results and establishes the National estimates. The survey indications used in State summaries are produced by the National summary. The ASB follows the same approach the assigned RFOs do in determining the National estimate.

Previous year's estimates are subject to revision when current year's estimates are set. Revisions are the result of late reports or corrected data. Price revisions can result from additional sales reported 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 estimates can be compared and bias determined.

Quality Metrics for Honey

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 table below describe the performance data for all surveys contributing to the publication. The accuracy of data products may be evaluated through sampling and non-sampling error. The CVs measure the error due to sampling as well as some nonsampling error. Nonsampling error is also evaluated by examining response rates and the weighted item 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 responds to 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.

Bee and Honey Inquiry Sample Size and Response Rates: To assist in evaluating the performance of the estimates in the Honey report, the sample size and response rates are displayed. Response rates overall for 2020 and 2021 are displayed.

Quality Metrics for Bee and Honey Inquiry - United States: 2020 and 2021

	Sample size		Response rate	
	2020	2021	2020	2021
	(number)	(number)	(percent)	(percent)
United States	8,063	7,408	64.6	61.3

Quality Metrics for Bee and Honey Inquiry - United States: 2019 and 2020

	Weighted item response rate		Coefficient of variation	
	2019	2020	2019	2020
	(percent)	(percent)	(percent)	(percent)
Honey production	55.5	55.5	0.2	2.0
Honey producing colonies ¹	53.8	55.7	0.1	1.4

¹ Honey producing colonies are colonies from which honey was harvested during the year. It is possible to harvest honey from colonies which did not survive the entire year.

Bee and Honey Inquiry Sample Size and Response Rate – States and United States: 2020 and 2021

State	Sample size		Response rate	
	2020 (number)	2021 (number)	2020 (percent)	2021 (percent)
Alabama	157	148	65.0	62.8
Arizona	46	41	60.9	56.1
Arkansas	122	104	70.5	79.8
California	545	504	49.4	46.6
Colorado	105	101	61.9	63.4
Florida	577	526	52.7	47.5
Georgia	305	272	61.3	52.9
Hawaii	40	46	50.0	47.8
Idaho	88	77	68.2	71.4
Illinois	308	296	70.5	68.6
Indiana	189	173	72.0	57.8
Iowa	170	159	72.9	71.1
Kansas	83	79	69.9	77.2
Kentucky	276	240	70.7	70.8
Louisiana	111	101	60.4	66.3
Maine	48	39	58.3	76.9
Michigan	266	228	67.7	55.3
Minnesota	195	169	61.0	64.5
Mississippi	111	98	68.5	75.5
Missouri	193	166	73.6	66.9
Montana	52	55	69.2	54.5
Nebraska	75	66	64.0	56.1
New Jersey	105	91	52.4	56.0
New York	272	285	60.3	62.8
North Carolina	337	296	70.9	74.3
North Dakota	115	103	57.4	58.3
Ohio	402	353	66.7	58.6
Oregon	163	143	64.4	66.4
Pennsylvania	274	335	67.2	70.4
South Carolina	157	144	64.3	54.9
South Dakota	81	73	77.8	61.6
Tennessee	273	257	78.4	61.1
Texas	408	370	62.0	45.4
Utah	67	75	79.1	74.7
Vermont	40	37	55.0	78.4
Virginia	254	233	69.7	70.0
Washington	180	145	68.9	57.9
West Virginia	150	133	76.0	71.4
Wisconsin	233	221	68.2	64.3
Wyoming	31	31	74.2	77.4
Other States ¹	459	395	61.0	63.5
United States	8,063	7,408	64.6	61.3

¹ Includes data for States not published in this table.

Quality Metrics for Bee and Honey Inquiry - States and United States: 2019 and 2020

State	Honey production				Honey producing colonies ¹			
	Weighted item response rate		Coefficient of variation		Weighted item response rate		Coefficient of variation	
	2019	2020	2019	2020	2019	2020	2019	2020
	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)	(percent)
Alabama	68.6	52.4	10.9	5.9	69.3	51.3	5.7	6.0
Arizona	83.3	73.9	6.9	1.3	82.2	80.7	7.6	1.4
Arkansas	65.6	59.0	1.1	1.8	65.4	62.6	1.4	1.5
California	51.0	41.0	0.2	0.8	51.1	45.3	0.3	0.7
Colorado	55.7	38.8	0.4	0.9	53.6	42.6	0.6	1.0
Florida	37.3	32.4	0.5	1.5	33.9	28.6	0.3	0.8
Georgia	69.2	48.3	0.6	1.7	74.1	56.2	0.5	1.4
Hawaii	88.9	99.9	1.5	1.2	78.6	99.8	2.0	4.1
Idaho	64.3	69.9	0.3	1.7	69.3	65.6	0.2	1.5
Illinois	76.9	96.0	3.7	6.1	73.5	96.4	3.8	4.0
Indiana	86.0	71.9	3.7	4.2	86.0	74.6	3.3	3.5
Iowa	69.9	75.4	1.1	1.5	67.9	72.8	1.0	1.2
Kansas	50.0	79.2	3.8	4.5	60.4	82.8	5.0	6.1
Kentucky	67.7	62.6	6.8	6.4	67.6	69.3	4.5	5.9
Louisiana	46.4	62.2	0.9	2.5	54.2	57.8	0.8	2.4
Maine	43.6	31.7	1.9	1.1	34.6	28.1	1.0	0.7
Michigan	40.1	34.7	1.4	1.2	33.9	37.1	1.2	0.9
Minnesota	53.6	56.3	0.2	1.4	53.1	58.5	0.2	1.3
Mississippi	89.0	92.8	0.6	2.2	85.7	92.2	1.2	2.1
Missouri	71.0	79.8	4.2	8.2	80.3	86.5	3.6	4.3
Montana	61.0	42.5	(Z)	0.4	58.6	46.7	0.1	0.5
Nebraska	63.0	55.8	1.4	1.4	64.3	57.8	1.0	1.6
New Jersey	25.0	23.1	1.2	3.6	24.2	13.3	0.9	1.9
New York	56.0	49.7	1.7	2.8	52.7	49.1	1.1	2.3
North Carolina	78.7	82.7	2.2	7.6	75.3	88.0	2.2	7.0
North Dakota	53.3	65.5	0.4	0.1	51.7	65.5	0.4	0.2
Ohio	53.7	85.5	2.3	13.5	58.8	84.4	2.1	8.6
Oregon	44.9	65.2	0.3	5.4	54.4	68.6	0.2	1.6
Pennsylvania	76.6	72.7	4.5	2.7	70.1	66.5	3.9	2.3
South Carolina	38.4	15.5	1.4	1.4	43.5	25.9	1.3	2.5
South Dakota	64.4	42.7	(Z)	0.8	51.4	44.5	0.1	0.7
Tennessee	90.4	88.3	4.9	7.4	83.7	84.9	3.8	6.5
Texas	36.9	59.3	1.4	31.8	37.9	64.0	1.4	23.0
Utah	44.0	60.8	0.3	4.2	52.8	55.8	0.2	3.3
Vermont	33.3	31.6	2.0	2.7	20.8	22.2	1.9	1.9
Virginia	75.3	79.4	6.1	6.8	75.0	79.4	4.9	6.0
Washington	65.5	68.9	0.5	0.7	76.6	69.2	0.4	0.4
West Virginia	31.8	86.6	3.4	6.6	32.1	81.9	3.1	3.9
Wisconsin	53.3	57.1	0.7	1.4	59.9	53.2	0.5	1.3
Wyoming	71.6	68.0	(Z)	(Z)	67.0	64.2	0.1	(Z)
Other States ²	58.7	53.0	1.7	2.7	58.6	64.3	1.6	2.8
United States	55.5	55.5	0.2	2.0	53.8	55.7	0.1	1.4

(Z) Less than half of the unit shown.

¹ Honey producing colonies are colonies from which honey was harvested during the year. It is possible to harvest honey from colonies which did not survive the entire year.

² Includes data for States not published in this table.

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

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- Cornell’s Mann Library has launched a new website housing NASS’s and other agencies 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.

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