Cost of Pollination Methodology and Quality Measures

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Cost of Pollination Survey Methodology

Scope and Purpose: The Cost of Pollination survey, conducted annually in all 50 states, collects information on acreage pollinated, colonies used, and dollars spent for a variety of different crops.

Survey Timeline: The Cost of Pollination survey began collecting data for the 2017 production year in October 2017 and concluded December 2017.

Sampling: The target population for Cost of Pollination estimation program is all farms and ranches with at least one acre of a crop determined to be potentially pollinated by honey bees. There were 34 specific crops, identified to use honey bee pollination, targeted in the Cost of Pollination sampling scheme, but additional crops were allowed to be reported in the "All Other Crops" field on the questionnaire.

The Cost of Pollination samples were selected using a Multivariate Probability Proportional to Size (MPPS) sampling scheme. Each record was assigned a measure of size based on list frame data for multiple specified commodities. Non-response groupings were formed based on each records probability of selection and previous pollination history. The 2017 sample size was 14,532 and the 2016 sample size was 19,931. Information provided in the 2016 survey was leveraged to reduce the sample size significantly in 2017 by targeting records with higher probability of paid pollination.

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, show the design applies sound statistical practice, ensure the data does not already exist elsewhere, and show that the public is not excessively burdened. The Cost of Pollination 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.

All sampled operations were mailed a questionnaire and given adequate time to respond by mail or electronic data reporting (EDR). Those that did not respond by mail or EDR were telephoned or enumerated in person.

Survey Edit: As survey data were collected and captured, they were edited for consistency and reasonableness using automated systems. Reported data were first edited as a "batch" of data when first captured. The edit logic ensures administrative coding follows the methodological rules associated with the survey design. Relationships between data items on the current survey were verified. The edit determined the status of each record to be either "dirty" or "clean". Dirty records were either updated or certified by an analyst to be accurate. Corrected data were reedited interactively. Only clean records were eligible for analysis tools and summary.

Analysis Tool: Edited data were processed through an interactive analysis tool that displays data for all reports by questionnaire item. The tool provided various scatter plots, tables, charts, and special tabulations that allowed the analyst to compare an individual record to other similar records within their state and region. These tools made outliers and unusual data relationships evident and Regional Field Office and Headquarters staff reviewed them to determine if they were correct. Suspect data found to be in error were corrected, while data found to be correct were kept.

Non-sampling Errors: Non-sampling errors are present in any survey process. These errors include reporting, recording, editing, and imputation errors. Steps were 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 the analysis tool.

Non-response Adjustment: Some producers refused to participate in the survey, others could not be located during the data collection period, and some submitted incomplete reports. These non-respondents were accounted for in order to make accurate estimates.

Estimators: Point estimates, called direct expansions, are calculated by multiplying the reported value by the non-response-adjusted weight and summing to a non-response grouping total. A variance estimate is also computed for each non-response grouping. Totals and variances are additive across non-response groupings to form a state estimate and states are additive to regional estimates.

Ratio estimates are also computed for many items. For example, dollars per acre values are calculated as the ratio of total dollars paid to acres paid for pollination. Both the numerator and denominator must be usable in order for that record to be used in the ratio estimator.

Estimation: Estimates were prepared by the Agricultural Statistics Board after reviewing recommendations and analysis submitted by each Regional Field Office. All data were analyzed for unusual values. Data from each operation were compared to their own past operating profile and to trends from similar operations. Data for missing operations were covered by weighting positive data of similar operations based on location and non-response grouping. National and State survey data were reviewed for reasonableness with each other, estimates from the previous year, and other USDA, NASS reports. In order to be published individually, a crop must have an appropriate threshold of paid pollinated acres in a region and meet USDA, NASS's confidentiality policy. If a crop did not meet either of these requirements, it was combined with all other unpublished crops under the "All Other" heading. Due to the differences in regions and years, the aggregate and other published estimates may include different crops. Due to the differences in regions and years, the aggregate and other published estimates may include different crops.

Estimation Regions: To improve the reliability and increase the number of estimates which could be published, estimates were published at a regional level, based on the regions used for the 2012 Census of Agriculture. Regions 6 and 7 were combined. The states in each region were as follows:

Region 1: Connecticut, Illinois, Indiana, Iowa, Kansas, Massachusetts, Maine, Michigan, Nebraska, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Wisconsin.

Region 2: Alabama, Delaware, Georgia, Kentucky, Maryland, North Carolina, South Carolina, Tennessee, Virginia, West Virginia.

Region 3: Arkansas, Florida, Louisiana, Missouri, Mississippi, New Mexico, Oklahoma, Texas.

Region 4: Colorado, Minnesota, Montana, Nevada, North Dakota, South Dakota, Utah, Wyoming.

Region 5: Alaska, Idaho, Oregon, Washington.

Region 6 & 7: Arizona, California, Hawaii.

Quality Metrics for Cost of Pollination Statistics

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 and the percent of the estimate from respondents.

Sample size is the number of observations selected from the population to represent a characteristic of the population. For Cost of Pollination, this number reflects operations with list frame acreage of targeted crops.

Response rate is the proportion of the sample that completed the survey, excluding those operations that did not have the item of interest or were out of business at the time of data collection. This calculation follows Guideline 3.2.2 of the OMB Standards and Guidelines for Statistical Surveys (September 2006).

Cooperation rate is the proportion of the sample that completed the survey. This includes records that did not have the item of interest or were out of business at the time of data collection.

Coefficient of variation (CV) is a measure of the relative amount of error associated with a sample estimate. Specifically, it is the standard error of a point estimate divided by that estimate, generally multiplied times 100 so that it can be reported as a percentage. This relative measure allows the reliability of a range of estimates to be compared. For example, the standard error is often larger for large population estimates than for small population estimates, but the large population estimates may have a smaller CV, indicating a more reliable estimate. Selected estimates on acreage paid for pollination and colonies used for pollination have CVs published on the USDA, NASS Quick Stats system: www.nass.usda.gov/Quick_Stats/

- High Reliability Estimate. CV less than 15 percent.
- Medium Reliability Estimate. CV between 15 percent and 29.9 percent.
- Low Reliability Estimate. CV 30 percent or higher. Caution should be used when using this estimate in any form. Please consult NASS for more information or guidance.

Cost of Pollination Survey Sample Size, Response Rate, and Cooperation Rate – United States: 2016 and 2017

Region [1]	Sample size		Response rate		Cooperation rate	
	2016	2017	2016	2017	2016	2017
	(number)	(number)	(percent)	(percent)	(percent)	(percent)
1	6,256	5,146	54.7	54.3	69.8	69.5
2	2,819	2,175	45.0	47.4	65.2	66.0
3	2,697	2,227	39.7	40.5	63.0	67.4
4	999	656	47.4	51.8	67.2	71.2
5	2,505	1,806	61.5	58.3	72.7	65.9
6 and 7	4,655	2,522	49.5	48.7	62.8	62.1
United States	19,931	14,532	50.8	51.0	66.8	67.0

[1] See Estimation Regions on page 2.

Information Contacts

Process	Unit	Telephone	Email
Estimation	Livestock Branch	(202) 720-3570	HQ_SD_LB@nass.usda.gov
Data Collection	Survey Administration Branch	(202) 720-3895	HQ_CSD_SAB@nass.usda.gov
Questionnaires	Data Collection Branch	(202) 720-6201	HQ_CSD_DCB@nass.usda.gov
Sampling and Editing	Sampling Editing and Imputation Methodology Branch	(202) 690-8141	HQ_CSD_SB@nass.usda.gov
Summary and Estimators	Summary Estimation and Disclosure Methodology Branch	(202) 720-2248	HQSDSMB@nass.usda.gov
Dissemination	Data Dissemination Office	(202) 720-3400	HQSDOD@nass.usda.gov
Media Contact and Webmaster .	Public Affairs Office	(202) 720-2639	HQOAPAO@nass.usda.gov

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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@nass.usda.gov.