SUPPORTING STATEMENT - PART B for

OMB Control Number 0535-0226:

2027 Census of Agriculture

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1Supporting Statement Part B

2027 CENSUS OF AGRICULTURE

OMB No. 0535-0226

COLLECTION OF INFORMATION EMPLOYING STATISTICAL METHODS

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g., establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided for the universe as a whole and for each stratum in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection was conducted previously, include the actual response rate achieved during the last collection.

The target population is all farms. A farm is defined as any operation from which $1,000 or more of agricultural products were produced and sold or would normally be sold during the reference year (2027). This definition has been used since the 1974 Census of Agriculture (conducted by the Census Bureau). The National Agricultural Statistics Service (NASS) maintains a list sampling frame containing names and addresses of operations qualifying as farms under this definition. The list frame is continuously updated and supports the NASS agricultural estimates program as well as the Census of Agriculture Program. Processes are in place to identify and eliminate duplication and inactive operators (e.g., deceased, retired, and out-of-business farmers), and to evaluate outside list sources to find new and missing farm operators.

The list building effort leading up to the 2027 Census of Agriculture started the year following the previous Census. During the five-year time span between the two censuses, NASS performs list building efforts to improve list coverage. List building is completed using two strategies: large general lists of potential farm operators available for all states and state-specific lists of targeted commodities.

The large general lists for all states that NASS processes each year include farm operators who utilize the Farm Service Agency, Risk Management Agency, and those that file federal tax forms related to agricultural production with the Internal Revenue Service. These lists are procured at the national level and produce a high success rate when matched against the NASS list sampling frame.

The other list sources vary by state. Staff target list sources for specific crop and livestock commodities. The targeted commodities include major commodities as well as specialty commodities, particularly those which NASS considers to be underrepresented on the list frame. Examples of major commodity list sources include livestock and crop producer organizations along with lists from state and local government agencies. Smaller list sources procured in the past include lists of goat operators, beekeepers, and producers who may have maple syrup taps. These lists have varying degrees of success in identifying farm operators but are considered a necessity to building a representative list sampling frame.

The 2026 National Agricultural Classification Survey (NACS) will be used to screen approximately 900,000 of these records to determine if they have any agricultural production and should be included on the Census Mail List (CML). The list development effort is expected to produce a list of approximately 3.935 million names and addresses of farm operators and potential farm operators for the Census of Agriculture.

Response to the Census is required by law under the “Census of Agriculture Act of 1997,” Pub. L. No. 105-113 (7 U.S.C. 2204g). The overall response rate for the 2022 Census of Agriculture was 61.0 percent. Response rates will be monitored, and follow-up strategies will be used in order to achieve sufficient response rates at the state and county levels. Follow-up may use a 8-page questionnaire that collects the minimum amount of information needed to determine if the operation qualifies as a farm and to allow the data to be used collectively with the data collected on the full-length Census of Agriculture questionnaire.

2. Describe the procedures for the collection of information including:

- **statistical methodology for stratification and sample selection,**
- **estimation procedure,**
- **degree of accuracy needed for the purpose described in the justification,**
- **unusual problems requiring specialized sampling procedures**

The goal of the estimation procedure for the Census of Agriculture is to produce agricultural totals for publication that are fully adjusted for list under coverage, nonresponse, and misclassification at the county level. As was done in 2012, 2017, and 2022, a capture-recapture methodology will be used for the adjustments. The paper titled, The 2012 Census of Agriculture: A Capture-Recapture Analysis (*Journal of Agricultural, Biological, and Environmental Statistics* 22(4): 523-539), describes these procedures.

The primary assumptions in capture-recapture are (1) that the population

is closed to the formation and deletion of farms between the two sampling periods, (2) that the probability of capture is the same for farms with a given set of characteristics, (3) that the probability of capture does not vary with sample, and (4) that being included in the June Area Survey (JAS) sample does not affect the probability of responding in the Census relative to farms not included in the JAS survey, which is approved under OMB No. 0535-0213.

With the six-month time between data collection for the JAS and the Census of Agriculture, the population will have had some new farms formed and others that have gone out of business. Kendall (1999 *Ecology* 80: 2517-2525) showed that, if the farms enter and leave the population at random (violation of (1)), the estimates are still unbiased, but the precision is decreased. Further, if the capture probabilities vary with time (violation of assumption (3)), the estimates continue to be unbiased.

NASS assumes that being included in the JAS sample does not affect the probability of response to the Census of Agriculture. With only two samples, it is not possible to test this assumption. If responding to the JAS increases the probability of response to the Census of Agriculture relative to farms that do not respond to the JAS, the estimate of the number of farms will be biased downwards; otherwise, if the probability of response to the Census of Agriculture decreases if a farm is in the JAS sample relative to other farms not in the sample, the estimate of the number of farms is biased upwards.

The capture probabilities do vary with type of farm (assumption (2)). To account for this variation in catchability in the models for coverage, response, and misclassification of CML farms, stepwise weighted logistic regression with cross validation will be used for model development, with the selection made from the variables reported on the Census of Agriculture. The key reporting variables (state, land in farm (in acres), operator’s sex, operator’s age, operator’s race/ethnicity, type of farm, and total value of production) will be included in all models.

To implement this method these two surveys (JAS and Census) are used. It is assumed that the surveys are independent and that farms with a given set of characteristics are equally likely to be captured on both surveys. NASS uses the JAS to estimate the number and types of farms not on the CML. The tracts in the JAS that are not on the CML are said to be in the “Not on the Mail List” (NML) domain. If a tract in the NML domain is determined to be a farm during the census, it is an NML farm. The CML is used with the NML in the capture-recapture framework to represent all farming operations across all states in the JAS sample. Although much effort is expended to make the CML as complete as possible, inevitably

the CML will not include all U.S. farms, resulting in list under coverage. Some farm operators who are on the CML will not respond to the Census, despite numerous attempts to contact them. In addition, although each operation is classified as a farm or non-farm based on their responses on the Census questionnaire, some will be misclassified (some non-farms will be classified as farms and some farms will be classified as non-farms).

Probability estimates for missing a farm due to nonresponse, misclassification, and under coverage are obtained via logistic regression models using matched records from the CML and JAS. These probability estimates are used in the capture-recapture model to adjust weights. The weights for these estimates are general purpose in that they do not provide any control over expected levels of commodity production. To address this a calibration algorithm is used to create the final set of weights. The calibration algorithm adjusts the weights to align indications with commodity totals from administrative sources and to reduce bias. The calibration algorithm outputs integer weights to ensure that totals for all sub-domains and cross-tabulations will balance in the final data products.

The NASS area frame, which is used for the independent June Area Survey (JAS), covers all land in the U.S (excluding Alaska) and includes all farms. The land in the U.S. is stratified by characteristics of the land. A probability sample of segments is drawn within each stratum for the JAS. The JAS sample of segments is allocated to strata to provide accurate measures of acres planted to widely grown crops, farm numbers, and inventories of cattle. In 2027, the operational sample will be increased to improve the farm counts for operations that produce specialty commodities or have producers that have historically been less likely to be found on the mail list. The supplemental sample will also enhance the capture-recapture modeling.

Prior to the beginning of data collection, input will be solicited from field office staff to identify a small portion of records that need to be specially handled (tagged records). These records may match other surveys, have multiple locations or unique operator structures, have existing data collection plans, or need to have data collected by statisticians or supervisory enumerators; many are typically large or complex operations which we have existing relationships and contact frequently.

In an effort to reduce response burden, NASS coordinates data collection activities with concurrent surveys. A majority of these Census of Agriculture questionnaires are matched with records in the Agricultural Resource Management Survey Phase 3 (ARMS 3), (OMB approval number 0535-0218) sample. The ARMS 3 survey collects whole farm data and has many similarities to the Census of Agriculture questionnaire.

NASS and the Economic Research Service (ERS) have collaborated on an 'integrated' questionnaire that incorporates all the necessary Census data items into the ARMS 3 questionnaire. Effectively, the ARMS 3 data collection will run concurrent with most of the Census of Agriculture data collection period, with operations in the ARMS 3 sample targeted for face-to-face enumeration. Upon conclusion of ARMS 3 data collection, the necessary data captured in ARMS 3 will be used for the Census of Agriculture.

Some other tagged records will be farms and ranches that have multiple locations and can be reported by one headquarters operation.

In the Decennial Census, which is conducted by the U.S. Census Bureau, all households are treated equally, and there are no adjustments for size for a larger home vs. a smaller home. However, with the Census of Agriculture, a small number of farmers could represent a large portion of production of a certain commodity. These records may be tagged so that NASS staff can ensure that these questionnaires are completed, possibly via personal enumeration.

Finally, there are a minimal number of records that have a long-established history with a specific enumerator. To honor the agreement, NASS staff tags these records for collection by that enumerator.

The consequences of normal handling of these records could manifest itself into increased response burden due to the potential need for follow-up contacts to verify data.

NASS intends to continue efforts to obtain Census of Agriculture data from individual American Indian farmers and ranchers on reservations in the 2027 census. Historically, the Census Bureau and NASS treated most American Indian reservations in the U.S. as single farming operations for the Census of Agriculture. A single report was obtained for the entire reservation, including data for any tribally operated farm or ranch and all individual farms and ranches. In 2007, NASS expanded its efforts to reach individual American Indian farms and ranches, on and off reservations. For the majority, individual operators were represented in the agriculture census data in all states. In a few instances, operator counts were obtained from reservations which preferred to report aggregated reservation data. Similar procedures will be used in 2027. NASS will also use a customized questionnaire for American Indian operations in the southwestern United States.

3. Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information

collected must be shown to be adequate for intended uses. For collections based on sampling a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.

Farms that potentially represent a large proportion of the total for a given commodity will be identified prior to data collection and categorized as "must case" records. These will be the top 0.1% to 1.5% depending on the number of farms with the commodity. Nonresponse from these operations often cannot be accurately adjusted for, so special efforts will be made to encourage response. During the data collection phase, these "must cases" are tracked and will be among the first to receive phone follow-up or personal enumeration.

NASS places a high priority on obtaining comprehensive and uniform coverage of all farms. In order to ensure sufficient coverage, NASS will utilize a Computer Assisted Telephone Interview (CATI) program specifically designed to target areas with lower response rates. Personal enumeration may also be used to target these areas.

Item nonresponse will be handled in one of four ways. First, deterministic imputation will be employed whenever the missing value can be derived from other cells on the questionnaire. Second, previously reported data from either a recent NASS survey or the previous Census of Agriculture, will be imputed, when appropriate. Third, a nearest neighbor donor (farm of similar type, size, and location) will be found and a value or relationship from the donor will be used for the recipient. If all of these automated options fail, the record will be referred to a statistician for resolution. Statisticians will utilize knowledge from training, existing agricultural knowledge, and data analysis tools to impute any missing data. On some occasions, they will recontact the respondent. Unit nonresponse is handled through weighting, as described in item 2, above.

Relative standard errors for all fully adjusted estimates will be published. In 2027, NASS will survey a comparable number of JAS segments for Census of Agriculture adjustments. Thus, the relative standard errors are expected to be similar to the 2022 Census of Agriculture.

4. Describe any tests of procedures or methods to be undertaken.

No content testing was conducted for the 2027 Census of Agriculture because very few changes were made to the questionnaire from the 2022 Census. The content and operational procedures remain consistent with those used in 2022.

To help optimize the web instrument, usability testing was conducted in 2024. This work was conducted under the OMB Generic Testing Docket OMB No. 0535-0248. Usability testing is a qualitative research technique in which participants are asked to complete a web data collection instrument online while the interviewer asks concurrent and retrospective probe questions. During this testing, the researchers look for features of the instrument that the participants understand, navigation issues, issues with format, etc.

Overall goals of the usability testing included:

- Understand potential measurement errors that may be associated with the instrument design,
- Determine whether participants can navigate the instrument, as intended,
- Gather feedback from participants on user-friendliness, and
- Evaluate overall use of the web instrument.

Finding and recommendations from the usability testing were used to help with the design of the web instrument. Some examples include:

- Redesigning/removing dynamic grid tables,
- Use of showing previously reported responses within the survey, and
- Number of questions presented on a single page, particularly screener questions.

5. Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name agency unit, contractor(s), grantee(s), or others who will actually collect and/or analyze the information for the agency.

Several NASS units contribute to developing the Census of Agriculture methodology, each containing staff members with prior Census of Agriculture experience. The contributing senior staff and unit leaders are:

Sample sizes, survey design, and survey administration and coordination for each State are determined by the Office of Survey Design and Methodology; the Acting Deputy Administrator is Nick Streff. Nicks's email is nicholas.streff@usda.gov and phone number is (402) 364-3453.

Data analysis methodology and data publication processes are determined by the Office of Analysis and Estimation; the Acting Deputy Administrator is Patrick Boyle. Patrick's email is patrick.boyle@usda.gov and phone number is (701) 212-8681.

During data collection, the intake, analysis, cleaning, and processing of incoming data is handled by the Office of Data Acquisition and Processing; the Acting Deputy Administrator is Troy Joshua. Troy's email is troy.joshua@usda.gov and phone number is (202) 690-3222.

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