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# Appendix A.

## Census of Agriculture Methodology

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### INTRODUCTION

The purpose of the Census of Agriculture is to enumerate all members of a population with a defined characteristic. For the American Samoa Census of Agriculture, that goal is to account for “any place that raised or produced any agricultural products for sale or home consumption.”

As in the previous censuses of the American Samoa, a direct enumeration procedure was used in the 2018 Census of Agriculture. Enumeration was based on a list of commercial farms compiled by the American Samoa Department of Commerce, in cooperation with the American Samoa Department of Agriculture, and the American Samoa Community College – Land-Grant, and supplemented by an electric meter list of the remaining households.

### THE CENSUS POPULATION

For the 2018 American Samoa Census of Agriculture, a list of commercial farm operators was compiled by the American Samoa Department of Commerce, the American Samoa Department of Agriculture, and the American Samoa Community College – Land-Grant. The core of this list was a compilation of all persons having a business license to sell agricultural products. The enumerators contacted all persons or operations on the list and completed a census report form for all farm operations that met the farm definition. If the person on the list was not operating a farm, the enumerator recorded whether the land had been sold or rented to someone else and was still being used for agriculture. If the land was sold or rented out, the enumerator obtained the name of the new operator and contacted that person, to ensure that he/she was included in the census.

The list of commercial farms was supplemented by a second sample of electric meters for the remaining households. The purpose of the second sample was to efficiently account for farms not on the commercial farm list and provide an accurate measure of the agricultural activity in American Samoa.

### DATA COLLECTION OUTREACH AND PROMOTIONAL EFFORTS

The Public Affairs Office (PAO) developed a communication plan largely based on promotional materials that were shared with local outreach partners, including but not limited to the American Samoa Department of Commerce, the American Samoa Department of Agriculture, the American Samoa Community College – Land-Grant, and local USDA agencies. The goal with these promotional materials included:

- Encouraging participation in the Census of Agriculture
- Communicating how the census will provide much needed data that are used by federal and local decision makers
- Explaining that response to the Census of Agriculture is required and that reported information is protected by federal law
- Increasing general awareness and perceived value of NASS, its products, and services

### Partnership and Local-Level Outreach

NASS officials met with leaders from agricultural organizations, the American Samoa Department of Commerce, the American Samoa Department of Agriculture, the American Samoa Community College – Land-Grant, and other USDA agencies to successfully secure their support in promoting the census among their constituencies. Stakeholders

partnered with NASS to promote the 2018 American Samoa Census of Agriculture through publications (e.g. newsletters), special mailings, speeches, social media, websites, and other communications. Through grassroots-level outreach and efforts, NASS partnered with a number of community-based organizations to reach all farmers and ranchers. Among the highlights of these partnership efforts was the participation of local government officials on radio public service announcements promoting the importance of the 2018 American Samoa Census of Agriculture.

## **Public Relations**

In the public relations arena, NASS worked with internal and external stakeholders to equip them with communications tools and resources to deliver the census communications message to their audiences. The materials included, but were not limited to: a press release/stakeholder notice, a public service announcement, flyers and posters and a Frequently Asked Questions (FAQs) document; which were drafted for local media and other stakeholder distribution. These materials were available both electronically and in hard copy. Other outreach tools included items such as pens and notepads.

## **DATA COLLECTION**

### **Method of Enumeration**

Personal enumeration was used in the 2018 American Samoa Census of Agriculture, and in the 2008 American Samoa Census of Agriculture, enumeration was based on a list of farm operators compiled by the American Samoa Department of Commerce, in cooperation with the American Samoa Department of Agriculture, and the American Samoa Community College – Land-Grant; along with a sample of all households not on the list. All of the operators on the list were enumerated with certainty, and a random sample of the remaining households was selected from an electric meter list to represent all operations not on the compiled list. The data from these households were given a weight equal to the inverse of their probability of selection to the sample. In a final effort to improve coverage in the western district, which is more heavily concentrated with agriculture activity, a phase 2 follow-up was aimed at

any household found on the electric meter list. Data from these households did not receive a sampling weight. The statistics in this report were collected from farm operators during the period from May through October 2019.

The enumerators were hired for the data collection phase of the census by the American Samoa Department of Commerce. Enumerators were divided into teams, with each team responsible for a given area. The enumerators were required to contact all households identified on lists in their assigned area and complete a census report form for all farm operations. If the person on the list was not operating a farm, the enumerator recorded whether the land had been sold or rented to someone else and was still being used for agriculture. If the land was sold or rented out, the enumerator obtained the name of the new operator and contacted that person, to ensure that he/she was included in the census.

### **Report Form**

Prior to each agriculture census, the content of all census report forms is reviewed to eliminate inquiries no longer needed, to identify new items necessary to meet user needs, and to better describe the agricultural situation in American Samoa. Data requests are solicited from farm organizations, land-grant colleges and universities, State and Federal agencies, State Department of Agriculture, agribusinesses, and other users. Each respondent is asked to identify and justify its specific data needs.

A single version of the report form for the 2018 American Samoa Census of Agriculture was prepared by NASS, in cooperation with the American Samoa Department of Commerce, the American Samoa Department of Agriculture and, the American Samoa Community College – Land-Grant; and various USDA agencies. Based on their comments, the content of the 2018 census report form remained almost unchanged from the previous census.

### **Training Program**

The project manager, and enumerators employed for the census in American Samoa received special

training in accordance with instructions prepared by NASS. The training included an overview of the census of agriculture program, and a detailed discussion of the enumerator's instructions manual and the census report form. Enumerators also practiced interviewing and filling out the report form before going out to the field.

## **REPORT FORM PROCESSING**

### **Data Capture**

The Census Bureau's National Processing Center (NPC) in Jeffersonville, IN was contracted to print, and ship the questionnaires to American Samoa. Completed questionnaires were then returned to NPC for data capture and scanning.

NASS staff on site at the NPC provided technical guidance and monitored NPC processing activities. All report forms returned to the NPC were immediately checked in, using bar codes printed on the questionnaires. With the small survey universe, it was determined that a key from paper application would be most economical. All forms keyed were then scanned and loaded into the Feith file cabinet. The images were available for analytical review of the data as well as for archive purposes.

The keying staff evaluated the contents and captured pertinent responses. An independent quality control process occurs after initial keying where ten percent of the captured data is keyed a second time. If differences existed between the first keyed value and the second, an adjudicator handled resolution. The decision of the adjudicator was used to grade the performance of the keyers, who were required to maintain a certain accuracy level or receive additional training. The measured error rate for the entire survey was 0.39%. The images and the captured data were transferred to NASS's centralized network and became available to NASS analysts on a flow basis. The images were available for use in all stages of review.

### **Editing Data**

Captured data were processed through a computer

formatting program. The program verified that record identifiers were valid and checked the basic integrity of the data fields. Rejected records were referred to analysts for correction. Accepted records were sent to a computer batch edit process. Each execution of the computer batch edit flowed as the data were received from the National Processing Center (NPC).

All census records were passed through a computer edit. The edit examined each record for reasonableness and completeness and flagged data items for review.

### **Data Analysis**

Once keyed, the data from each report form were available to NASS analysts in Washington, DC, via electronic media, for computer editing and analysis. Data from each report were subjected to a detailed item-by-item computer edit. The edit performed comprehensive checks for consistency and reasonableness, corrected erroneous or inconsistent data; supplied missing data based on similar farms, and assigned farm classification codes necessary for tabulating the data.

Prior to publication, tabulated totals were reviewed by statisticians to identify inconsistencies and potential coverage problems. Comparisons were made with previous census data, as well as other available data. Tallies of all selected data items for various sets of criteria which included, but were not limited to, geographic levels, farm types, and sales levels were reviewed. When necessary, data inconsistencies were resolved.

## **DISCLOSURE REVIEW**

After tabulation and review of the aggregates, a comprehensive disclosure review was conducted. NASS is obligated to withhold, under Title 7, U.S. Code, any total that would reveal an individual's information or allow it to be closely estimated by the public. Farm counts are not considered sensitive and are not subject to disclosure. Cell suppression will be used to protect the cells that are determined to be sensitive to a disclosure of information.

Based on agency standards, data cells were determined to be sensitive to a disclosure of information if they failed either of two rules. First, the threshold rule failed if the data cell contained less than three operations. For example, if only one farmer produced hogs on the island, NASS could not publish the island total for hog inventory without disclosing the individuals' information. Second, the dominance rule failed if the distribution of the data within the cell allowed a data user to estimate any respondent's data too closely. A (p)-percent rule will be used to determine dominance. Under this rule, if the two largest contributing farms' values to the county total are subtracted from the estimated total, the remainder must exceed a specified (p)-percent of the largest contributed value. If the remainder fails to exceed the specified percentage, the value is not published. For example, if there are many farmers producing hogs on the island and some of them were large enough to dominate the cell total, NASS could not publish the county total for hog inventory without risking disclosing an individual respondent's data. In both of these situations, the data were suppressed and a "(D)" was placed in the cell in the census publication table. These data cells are referred to as primary suppressions.

Since most items were summed to marginal totals, primary suppressions within these summation relationships were protected by ensuring that there were additional suppressions within the linear relationship that provided adequate protection for the primary. A detailed computer routine selected additional data cells for suppression to ensure all primary suppressions are properly protected in all linear relationships in all tables. These data cells are referred to as complementary suppressions. These cells are not themselves sensitive to a disclosure of information, but were suppressed to protect other primary suppressions. A "(D)" was also placed in the cell of the census publication table to indicate a complementary suppression. A data user cannot determine whether a cell with a (D) represents a primary or complementary suppression.

NASS analysts reviewed all complementary suppressions to ensure no cells had been withheld that

were vital to the data users. In instances where complimentary suppressions were deemed critically important to the Island, analysts requested an override and a different complement cell was chosen.

## **ESTIMATION**

Estimates were produced from two components, a list component and an electric meter component. The list component population was made up of some 2,428 commercial farm operations identified by the American Samoa Department of Commerce, American Samoa Department of Agriculture, and the American Samoa Community College – Land-Grant prior to the census. All farm operations on the list were enumerated. Since all records did not respond a weight adjustment was completed for nonresponse.

Since the electric meter component involved sampling, on average, each of the operations found in the electric meter component represented about two other farms that would not have been included in the list component. As a result, the data from these farming operations found in the electric meter component were expanded, or weighted, to account for the farms not selected in the sample. For the phase 2 follow-up in the western district, the entire electric meter population was attempted to be contacted.

## **SAMPLING ERROR**

Estimates made for the 2018 American Samoa Census of Agriculture are subject to sampling error. This type of error arises because a sample of households are selected to estimate the electric meter component. Since resulting estimates were obtained based on a sample of households, these estimates were not necessarily equal to the actual values that would have been obtained had a complete canvass of all households been undertaken.

## **Variability in Census Estimates due to Statistical Adjustment**

In conducting the 2018 American Samoa Census of Agriculture, efforts were initiated to measure error associated with the electric meter sample and the adjustments for farm operations that were on the list of farm operators, but did not respond to the census

report form. This error measurement was developed from the standard error of the estimates at the island level, where appropriate, and were expressed as coefficients of variation (CVs) at the island level. Coefficients of variation are displayed in the Quick Stats database.

Coefficient of variation 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. Every estimate for the 2018 American Samoa Census of Agriculture has a corresponding CV published with it. NASS has identified the following index to use when evaluating coefficient of variation for the 2018 American Samoa Census of Agriculture.

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

## **NONMEASURED ERRORS IN THE CENSUS PROCESS**

As noted in the previous section, sampling errors can be introduced from the nonresponse adjustment procedure. This error is measureable. However, nonsampling errors are imbedded in the census process that cannot be directly measured as part of the design of the census, but must be contained to ensure an accurate count. Extensive efforts were made to compile a complete and accurate list of farmers for the census, to design an understandable report form with clear instructions, to train enumerators on how to ask

the questions and record the answers on the report form, and to minimize processing errors through the use of quality control measures. The weight adjustment and tabulation processes recognize the presence of nonsampling errors; however, it is assumed that these errors are small and that, in total, the net effect is zero. In other words, the positive errors cancel the negative errors.

## **Coverage**

The main objective of the American Samoa Census of Agriculture is to obtain a complete and accurate enumeration of all farms covered by the list frame and electric meter frame in American Samoa with accurate data for all aspects of the agricultural operation. However, the cost and availability of resources for the enumeration place restrictions on operationally feasible data collection methodologies. Such restrictions may lead to the exclusion from enumeration of farms which should have been included in the sample; this type of nonsampling error is known as coverage error.

Despite the use of intensive field quality control procedures designed to ensure complete enumeration of all selected households, coverage error may have resulted from the inability of enumerators to enumerate all farms in the sample assigned to them. During the 2018 American Samoa Census of Agriculture, coverage error may have resulted from the inability to correctly identify all duplicate records within the list frame or between the list and electric meter frames.

## **Respondent and Enumerator Error**

Incorrect or incomplete responses to the census report form or to the questions posed by an enumerator can introduce error into the census data. Steps were taken in the design and execution of the census of agriculture to reduce reporting errors. Poor instructions and ambiguous definitions lead to misreporting. Respondents may not remember accurately, may estimate responses, or enumerators may record an item in the wrong cell. To reduce reporting and recording errors, detailed instructions for completing the report form were provided to each

enumerator, and questions were phrased as clearly as possible. In addition, each respondent's answers were checked for completeness and consistency by a computer edit.

### **Processing Error**

All phases of processing of each census report form are sources for the introduction of nonsampling error. The processing of census report forms includes clerical screening for farm activity, follow-up of nonrespondents, keying and transmittal of completed report forms, computerized editing of inconsistent and missing data, review and correction of individual records referred from the computer edit, review and

correction of tabulated data, and electronic data processing. These operations undergo a number of quality control checks to ensure as accurate an application as possible, yet some errors may ultimately remain undetected.

### **Item Nonresponse**

All item nonresponse actions provide another opportunity to introduce measurement errors. Regardless of whether it was previously reported data, administrative data, the nearest neighbor algorithm, the fully conditional specification method, or manually imputed by an analyst, some risk exists that the imputed value does not equal the actual value.